THE IRON TRADE REVIEW

VOLUME XXXV. CLEVELAND, O., MARCH 6, 1902. NUMBER 10

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Pressure from the raw material end of the market has caused some advances in finished products in the past week. Iron and steel bars, muck bar, wrought pipe and shafting have been advanced, and structural material is now so largely in second hands that the quotations by mills unable to make deliveries for from eight to ten months are no longer significant. In the foundry pig iron market the feature of the week is the withdrawal from the market of large interests that announced a fortnight ago that half their expected output for 1902 was yet to be marketed. As these interests refused to advance the price above $12 at furnace for No. 2 foundry while other Southern producers were making sales at $13, they naturally booked very heavy orders and in the past two weeks the tonnage they have taken has made a great inroad upon the iron available for delivery in the balance of the year. It is evident that the policy of holding down prices and of giving broadcast assurance that there will be plenty of iron for everybody in the second half was not fully effective in stopping the rather excited effort to cover for the balance of the year. In the past week, however, there has been some moderation of the buying pace, and it appears that a very considerable number of foundry buyers are even yet willing to await developments before completely covering for the entire year. On the other hand a few are covering for the first quarter of 1903. The largest users of iron are the ones that have been most ready to anticipate their wants. The smaller buyers, as a rule, have made relatively less provision for the future. Pipe works have taken a large tonnage in the recent buying movement. The fact that basic iron is so much larger a factor in Southern pig iron production than heretofore is to be reckoned with. This has cut down the ability of some Southern producers to supply foundry grades, and in the Mahoning and Shenango Valleys the production of foundry iron in the coming year will be less than in the past year. Recently an independent steel company bought a large quantity of Bessemer from Southern Ohio furnaces, delivery June to December, and the supply of foundry iron from this district will therefore be decreased. Southern Ohio furnaces have advanced No. 2 foundry iron from $16.50 to $17 at furnace in the past week. Foundry iron from Valley furnaces ranges from $16 to $17.50 for No. 2 at furnace. Southern furnaces making car wheel iron are practically sold for the year and the Southern Ohio high silicon irons are off the market. Bessemer and basic irons are higher. Of the former about 15,000 tons were sold in the Central West in the past week at $16.75 to $17 at furnace. The floods of last week closed down a number of steel plants in the Pittsburg district and in Central Pennsylvania, and delayed deliveries of coke, pig iron and finished materials in other districts as well. A better service out of the coke regions is expected for this month, and as the season advances the transportation troubles that are at the foundation of much of the scarcity of pig iron, steel and finished products, will be gradually lessened. The week has brought no new development regarding imports of steel. The United States Steel Corporation has made no purchases beyond the 15,000 tons noted last week, though there was some figuring on a 50,000-ton lot. A 7,000-ton sale of billets at $30 and an 8,000-ton sale of sheet bars at $31 mill, by a steel corporation company, are reported, delivery in second half. An advance of $2 in bar iron was followed by a like advance on steel bars. While the agreed minimum prices on steel bars are unchanged all but the largest tonnages carry the advance. The structural mills maintain old prices, but dealers have made advances of from $4 to $8 a ton on shapes out of stock.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, March 5.

The pressure of the constantly advancing market in raw material is beginning to result in advances in finished products and by agreement the price of iron bars was advanced the latter part of last week $2 a ton, or to 1.70c Pittsburg. While no advance was made in steel bars by formal action, the quotation remaining nominally at 1.50c, Pittsburg, for Bessemer bars, it is practically understood among the steel bar manufacturers that 1.60c should be asked on all business except that which runs into extremely large tonnage. The mills rolling structural material in this district are practically filled until October 2nd premiums of $5 per ton are being asked on small lot orders that can be filled from left overs on large orders during the next six months. The shafting manufacturers have also advanced prices. Muck bar is now quoted at $31.50, an advance of $1.50 within a week. There has also been a very slight advance in the price of black and galvanized merchant pipe.

That large consumers have confidence in the strength of the steel situation is indicated by purchases of steel billets and sheet bars by independent mills for delivery running through the entire last half of the year. A sale of sheet bars was made by the largest producer to one of its regular customers at a price equivalent to about $31 in the Valley. This contract calls for 8,000 tons. A sale of billets by an independent steel producer for Eastern delivery amounting to 7,000 tons was made at $30 per ton, at mill. The sale of sheet bars by the largest producer for delivery the second half of the year, to an independent mill, despite the fact that a shortage of steel is already upon them, indicates a willingness to take care of regular trade. These two sales are probably the first to be made thus far for the second half and indicate pretty well the range of prices that will be asked for such delivery.

While a number of large inquiries are out for foreign steel very few have been closed up to the present time owing to the desire of a number of large consumers to await developments within the next month, when it is believed the freight situation will be greatly improved thus aiding the mills in increasing their output. The United States Steel Corporation has been considering the purchase of 50,000 tons of foreign billets, but no order has as yet been placed and probably will not be for some time. Outside of the order placed last week for 15,000 tons nothing has been done. The English steel manufacturers are not in position to bid for any of the American trade owing to the relatively high prices there on both billets and sheet bars and it is extremely doubtful if they will be able to accept any of this business in competition with the German mills. Low phosphorus melting stock is being imported by both the

United States Steel Corporation and independent steel manufacturers at prices ranging from $21 to $22 per ton. We have also been advised of the sale of a small lot of low phosphorus pig iron at $22, Pittsburg, by English producers.

Owing to the flood, steel mills along the Allegheny and Monongahela rivers were compelled to suspend operations for several days, and owing to the accumulation of mud on the machinery a number of mills will be out of service for fully a week.

PIG IRON.—Considerable Bessemer iron for second half delivery has been sold for Western shipment during the week at $16.75 to $17 at the furnace. The total tonnage approximates 15,000. We also note the sale of 1,000 tons of forge for delivery during the next three months at $16.75, Pittsburg. Foundry iron for almost any delivery commands fancy prices, one 200-ton lot for delivery the second half of the year having been placed at $17.75 per ton. No. 1 has sold as high as $18.50, Pittsburg in small lots while No. 3 is held at $17 per ton. Northern furnaces that are in position to deliver basic iron up to July 1 are asking $18, Pittsburg. Despite the flood in this district which practically tied up coke shipments for several days, only a few furnaces in the Valleys were compelled to bank. The coke situation is beginning to grow better daily and within a week or ten days it is believed that the operation of the furnaces will no longer be impaired on account of the shortage of coke. We revise quotations as follows:

Bessemer, Valley	$16 75 to 17 00
Bessemer, Pittsburg	17 50 to 17 75
No. 1 Foundry	18 00 to 18 50
No. 2 Foundry	17 25 to 17 75
No. 3 Foundry	16 50 to 17 00
Gray Forge, Pittsburg	16 50 to 16 75
Chilled Basic, Valley	16 50 to 16 75
Chilled Basic, Pittsburg	17 25 to 17 50

STEEL.—The scarcity of steel continues but the sale of billets and sheet bars for delivery the second half of the year would indicate that there is still tonnage to be had for this delivery. The largest producer made a sale of 8,000 tons of sheet bars for delivery during the last six months of the year at $31 Youngstown. We also note the sale of 7,000 tons of Bessemer billets for Eastern shipment at $30 per ton at mill. During the week a large independent producer in Pittsburg has purchased ingots for delivery up to July 1, which indicates a shortage of steel on the part of this plant. Foreign sheet bars for delivery the first half of the year are held at $33, Pittsburg, while billets are quoted at $31.50 to $32. The German market continues firm and indications point to further advances. The situation in rods is exceptionally strong and consumers are offering premiums to secure prompt delivery. We note a sale of 200 tons at $36. Jones & Laughlins, Ltd., owing to an accident to their rod mill will be unable to make deliveries for 30 days at least, thus reducing the available supply of rods by fully 5,000 tons.

FERRO-MANGANESE.—The price of manganese continues unchanged and we quote domestic 80 per cent at $52.50 per ton. Foreign is held at $50 per ton.

SPELTER.—The spelter market continues to advance and prime Western grades are held at 4.15c to 4.20c, Pittsburg.

MUCK BAR.—There have been further advances in the price of muck bar and we note the sale of 1,000 tons at $31.50 per ton at mill.

SKELP.—Despite the advancing steel market steel skelp both grooved and sheared is quoted at 1.75c, and iron skelp at 1.85c.

RAILS AND TRACK MATERIAL.—The Grand Trunk Railway is in the market for 25,000 tons of rails. It is probable that this order will be placed with German manufacturers. We also note the importation of 1,000 tons of rails for delivery during April. The order was placed with English mills. The Ohio plant of the National Steel Co. will be placed on rails within a few weeks. This will greatly increase the output of the United States Steel Corporation and will permit of the delivery of a large tonnage according to specifications. Our quotations follow: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $42; 12 pounds, $38; 16 pounds, $35; 20 pounds, $35; 20 pounds, $34; 25 to 40 pounds, $32. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—The plate market continues unchanged. Prices remain firm, despite the fact that the amount of new business that is being offered is not above the normal amount. We make the following quotations: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

PIPES AND TUBES.—A slight advance has been made in the price of both black and galvanized merchant pipe. The volume of business that is being closed by the pipe mills is enormous, and the indications point to the largest spring trade in the history of the business. Discounts to consumers in carload lots, Pittsburg, are revised as follows:

MERCHANT PIPE.

	Blk. Per cent.	Galvd. Per cent.
⅛ to ⅜ and 11 to 12 inches	60	48
½ to 12 inches	67½	55

BOILER TUBES.

Steel.

	Per cent.
1 to 1¾ inches	47½
2¼ to 5 inches	65¼
1¾ to 2¼ and 6 to 13 inches	60

Iron.

	Per cent.
1 to 1¾ and 2¼ inches	43½
1¾ to 2¼ inches	43
2¼ to 13 inches	53

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12¼ inches	65

BARS.—The bar iron manufacturers have advanced the price of common iron bars to 1.70c, Pittsburg, full freight added to points of delivery, Pittsburg as the basing point. A considerable amount of business has been closed at this price by both the American Steel Hoop Co. and the Republic Iron & Steel Co. deliveries running into the third quarter. While the price of steel bars remains unchanged the mills are securing an advance of $2 per ton on all business except very large orders. A number of the mills asked that prices be advanced $2 per ton but it was decided to make this discrimination and permit each mill to make a quotation as deemed advisable. We revise quotations as follows: Bar iron, 1.70c, Pittsburg, with full freight added to point of delivery; refined iron bars, 1.90c and upwards; Bessemer steel bars, 1.50c to 1.60c; open-hearth, 1.60c to 1.70c; plow beams and cultivator beams, 1.50c, net; channels, angles, zees and tees, Bessemer under three inches, 1.60c; over 3 inches, 1.70c. Hoops and bands are quoted at 1.90c, full extras.

SHEETS.—Considerable business continues to be offered in both the heavier and lighter gauges of sheets. For forward shipment the independent mills are quoting the prices of the American Sheet Steel Co. but for prompt delivery from $2 to $3 per ton above these prices is asked. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets are quoted at 70, 10 and 5 off in carload lots; less than carload lots, 70 and 10 off.

STRUCTURAL MATERIAL.—Both the structural mills of the Carnegie Steel Co. and Jones & Laughlins, Ltd., have orders on their books which will keep their mills in full operation until October. The Cambria Steel Co. is out of the market entirely and any considerable order of material is consequently hard to place for delivery before next fall. On small lots which can be made up from over-rolled orders $5 per ton is being secured by all the mills above the agreed prices which are as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—At a meeting of the wire nail manufacturers held last week no change was made in either wire nails or wire products. A meeting of the cut nail manufacturers will be held this week and it is believed that a slight advance will be announced. We make the following quotations: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire $2.40 in carload lots;

polished staples $2.20 and galvanized staples $2.60; painted barb wire $2.60 and galvanized $2.90. These prices are quoted on a Pittsburg base plus the actual freight to destination. Cut nails are held at $1.95 in carload lots and $2 in less than carload lots, Pittsburg, plus freight to destination.

Later.—The price of cut nails was advanced 5 cents a keg at a meeting of the manufacturers on Tuesday.

MERCHANT STEEL.—The manufacturers of shafting have announced another advance and carload lots are now quoted 50 off, and less than carload lots are held at 45 off. We make the following quotations: Turned, cold rolled and ground shafting in carload lots 50 off, and in less than carload lots 45 off; tire steel, 1.70c in carload lots and 1.80c less than carload lots; toe calk 2.10c to 2.25c; sleigh shoe, 2c to 2.25c; machinery steel, 1.50c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—Owing to the extreme scarcity of low phosphorus melting stock considerable is being imported from abroad by both the United States Steel Corporation and independent steel producers. Foreign stock can be delivered in Pittsburg at $22. The old material market throughout is very strong. We revise quotations, gross tons, as follows: Heavy melting stock, $17.75 to $18.25; steel rails, $17.75 to $18; busheling scrap, $13.50 to $14; No. 1 wrought, $18 to $18.50; iron rails, $23.50 to $24; cast borings, $9 to $9.25; cast scrap, $15.75 to $16.

COKE.—For the week ending Saturday, Feb. 22, the total production of Connellsville coke amounted to 217,682 tons, a gain over the previous week of more than 5,000 tons. On running contracts furnace coke from the Connellsville region is quoted at $2.25 per ton and foundry coke at $2.75. Outside coke is sold at about 25 cents per ton less than the above quotations, though higher prices are obtained on prompt shipments.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
634 MONADNOCK BLOCK, March 4.

In every department of production, the market continues exceedingly firm, and the difficulty of getting material, both raw and finished product, for early shipment, grows more pronounced daily. The constantly increasing pressure which has been made upon mills for several weeks past, and their inability to keep pace with orders, has resulted in the turning of a large tonnage to jobbers, and prices out of store have rapidly advanced. In the past week, beams and channels out of stock have advanced $5 a ton; angles and tees, $8 a ton; cold rolled shafting, 10 per cent; galvanized sheets, 2½ per cent; merchant pipe, 3⅓ per cent net; carriage spring steel, $3 a ton. In addition the mill prices of bar iron and steel have been increased in some quarters $2 a ton, while pig iron for delivery in one or two months still commands a premium of $1 and more a ton, according to the order and the status of the buyer with the seller. The coke situation is again growing serious, the local receipts from the Connellsville regions daily becoming less. That these will be still further seriously curtailed by the floods in the Pittsburg region is inevitable, and furnacemen and foundrymen view the immediate future with forebodings. There is no diminution in the demand for material of all kinds, notwithstanding that most of the mills have announced for several weeks past they can take no more orders for delivery within six months.

PIG IRON.—Practically all the iron that is being sold in this market is by Southern furnaces, which are the only ones in a position to promise delivery with any certainty of carrying it out. These have booked a large tonnage in the past two weeks and most of them are sold up for the third quarter. The local office of one large Southern seller has received instructions to withdraw from the market for the balance of the year, and several Virginia furnaces have refused to sell any more iron until a better car service is promised; the latter, while they have the material in yards, have experienced considerable delay in making shipments for want of rolling stock. At the present time it is impossible to say what the prices of the various grades of standard Birmingham irons for delivery in this market are. Each individual order has to stand on its own bottom, and until the situation clears up no positive prices can be obtained either for quick shipment or future delivery. A large tonnage has been turned down in the past week, including several big orders, the reason being that either the furnace could not guarantee the delivery desired, or preferred to wait until the present nervousness had subsided, or that the buyer would not pay the price demanded. Among malleable foundries, the latter feeling is particularly strong, and an effort is being made by some to reduce the buying to a minimum in the hope that it may result in a lowering of prices. Local irons are very scarce, the largest seller in this market still refusing to book orders for delivery in the last half. The Sydney furnace at Mayville, Wis., is still out of blast for want of fuel, and stack No. 6, of the Illinois Steel Co., at South Chicago, which has been undergoing repairs, is now only waiting for coke to blow in. Our quotations follow:

Lake Sup. Charcoal	$20 00 to $21 00	Southern Coke No. 4, 14	65 to $14 90
Local Coke Fdy. No. 1	17 50 to 18 00	Southern No. 1 Soft	$16 15 to 16 40
Local Coke Fdy. No. 2	17 50 to 18 00	Southern No. 2 Soft	15 35 to 15 90
Local Coke Fdy. No. 3	16 50 to 17 00	Southern Gray Forge	14 65 to 14 90
Local Scotch Fdy. No. 1	18 50 to 19 00	Southern Silveries	16 65 to 17 65
Local Scotch Fdy No. 2	18 00 to 18 50	Jackson Co. Silveries	18 00 to 18 50
Southern Coke No. 1	16 40 to 16 65	Ohio Strong Softeners	18 50 to 19 00
Southern Coke No. 2	15 65 to 15 90	Alabama Car Wheel	20 50 to 21 00
Southern Coke No. 3	15 15 to 15 40	Malleable Bessemer	18 50 to 19 00

BARS.—As a result of the advance in both iron and steel bars made by Eastern mills last week, some of the local manufacturers have advanced prices $2 a ton. A number of the independent mills in this city have been getting this increase, however, in the shape of premiums, for several weeks, though on contracts for future delivery 1.65c for steel and 1.75c for iron has been the minimum price. Buying in the past week has been active, and specifications on contracts excessively large. We quote iron, 1.85c, Chicago; steel, 1.75c; out of store 2c to 2.10c.

SHEETS.—There is a decided improvement in the local demand, and prices are firmer than they have been for some time. Inquiries are numerous, and the tonnage sold is of good proportions. We quote No. 27 black from store, 3.30c to 3.40c, and galvanized 70 per cent to 70 and 2½ per cent.

STRUCTURAL STEEL.—Though all the large producers are out of the market, there is no decrease in the demand for material, and some promoters are reported to be planning new buildings for construction. The price of beams and channels out of store has been advanced $5 a ton, and angles and tees, $8 a ton. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 6x6 and under, 1.75c; over 6x6, 1.85c; plates, 1.75c; base, tees, 1.80c; zees, 1.75c; lots from store, angles, 2.50c, minimum; tees, 2.55c, minimum; beams and channels, 2.50c per pound, minimum.

RAILS AND TRACK SUPPLIES.—About all that can be said, is to repeat the report we have made for several weeks past. Mills are sold up on standard rails as far as November, and on light rails for periods varying from three to five months. There is no lack of inquiries, which, however, are invariably withdrawn when the situation is learned. We quote as follows: Standard rails, $28; light sections, $34 to $36, according to size; out of store, $40 to $44; splice bars, 1.70c to 1.80c; spikes, 2.10c; track bolts and hexagon nuts, 2.80c to 2.90c, out of store, 2.90c to 3c; square nuts, base, 2.65c to 2.75c; out of store, 2.75c to 2.85c.

MERCHANT STEEL.—Some good-sized contracts are coming forward for delivery in the second half of the year, a number of implement manufacturers sounding the market for supplies for this period. Carriage spring steel has been advanced about $3 a ton. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c, which can be shaded on carload lots; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe, 1.65c to 1.80c, flat sizes; concave and convex, 2c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

BILLETS.—Mills having none for sale, are not seeking business. Inquiries are numerous, however. We quote Bessemer billets, $31 to $33, open hearth, $33 to $35.

PLATES.—While new business is of good proportions, and specifications against contracts are improving in size and number, the local mill is not experiencing the same demand for plates as are manufacturers in other lines. It can deliver material in four to six weeks. Prices for stock from store are

firm, and on small orders have been advanced. We quote as follows: Tank steel, base, ¼-inch, 1.75c to 1.85c; flange steel, 1.90c to 2c; marine steel, 1.95c to 2.10c; firebox steel, ordinary, 2c to 2.10c; special, 2.25c and upward. Jobbers are selling from store according to size as follows: Tank steel, 1.90c to 2c; flange steel, 2.10c to 2.25c; marine steel, 2.40c to 2.50c; firebox steel, ordinary, 2.40c to 2.50c; special, 2.50c and upward.

CAST IRON PIPE.—With the approach of mild weather, orders are growing in size and number. In the past week, about 15,000 tons of pipe have been contracted for, though the inquiry represents a much larger tonnage. Prices are very firm, as follows: 4-inch water pipe, $29, carload lots, f. o. b. Chicago; 6-inch water pipe, $28; 8-inch and larger sizes, $27; gas pipe, $1.00 per ton higher than above prices.

MERCHANT PIPE.—Prices have been advanced in the past week about 3⅓ per cent net. Business is growing in volume, which is due largely to the spring weather which has prevailed in the west in the past week. Our quotations follow:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	58½	46½
½ to 12 in.	66	53½

BOILER TUBES.

	Steel Per cent.	Iron Per Cent.
1 to 1¼ in.	40	35
1¼ to 2¼ in.	47½	37½
2¼ to 5 in.	57½	47½
6 in. and larger	45	40

WIRE AND WIRE NAILS.—There has been a heavy volume of business in the past week, and the local interest has orders on its books sufficient to tax its capacity for two to three months. All jobbers and hardware dealers report that a heavy spring trade is expected, and are making strenuous efforts to get sufficient material on hand to meet it. We quote as follows: Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire, in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents for less than carloads.

COKE.—The condition of the local coke supply has grown more acute in the past week, owing to the floods in the Connellsville regions, which have already made themselves felt in this market in the still further curtailment of receipts. For some weeks, both furnaces and foundrymen have only been getting enough fuel to insure them one or two days' operations and have had to depend on the daily supply for assurance whether they would be able to continue work beyond this period. Two furnaces in this territory are now out of blast for want of fuel, and more will follow unless there is an improvement this week. Foundrymen are buying spot coke wherever it can be got, and are paying from $6 to $6.50 per ton for same.

OLD MATERIAL.—Scrap of all kinds is in active demand, and mills are heavy buyers. Dealers report they experience no trouble in getting the present prices, which in many cases represent advances. We quote as follows:

Old iron rails	$22 50 to $23 50	Relaying rails	27 00 to 28 00
Old steel rails, 5 ft. and up	23 00 to 23 50	Old wheels	$17 50 to $18 00
Old steel rails, mixed	16 00 to 17 00	Heavy melting steel	15 50 to 16 00
		Mixed country steel	11 00 to 11 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$17 50 to $18 50	Steel Axles	$18 50 to $19 00
No. 2 R. R. wrought	16 00 to 16 50	Cast borings	6 50 to 7 00
Dealers' forge	14 00 to 15 00	Wrought turnings	11 50 to 12 00
No. 1 busheling	12 50 to 13 00	Iron axle turnings	12 50 to 13 00
No. 1 R.R. & mach. cst.	13 00 to 13 50	Steel axle turnings	12 00 to 12 50
Railway malleable	13 00 to 14 00	Stove plates	10 00 to 10 50
Country malleable	11 50 to 12 00	Old iron splice bars	18 00 to 18 50
Iron axles	22 00 to 22 50		

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, March 5

There is no new development either in the ore or the vessel situation. The furnace interruptions since navigation closed will leave more ore on dock in the spring than was counted on, and estimates of the amount of ore that will be brought down this year leave furnacemen at ease about their uncovered supply. As high as 23,000,000 tons has been figured upon by close students of the mining situation, and instead of 45 per cent the Mesabi range is counted on to contribute 55 to 60 per cent, or 13,000,000 to 14,000,000 tons. This means that there is yet considerable Mesabi ore to be sold. The vessel situation has not changed. Several million tons of ore are yet to be covered and the difference between shippers and vessel men is still one of 5 cents—80 cents against 75 cents from the head of the lake.

PIG IRON.—The floods of the past week have brought more trouble to the furnacemen's door. Interrupted coke shipments have threatened further bankings and March gives little promise of improvement over February in rate of pig iron production. The buying of foundry iron keeps up in steady volume for the second half of the year. Some check has been given by the withdrawal of some Southern sellers from the market, notably those who have been quoting the lowest prices recently and who therefore took on heavy tonnages in February. Among Northern sellers the disparity is now $1.50 a ton on No. 2 foundry iron, represented in quotations of $16 and $17.50 at Valley furnace. There is much iron yet to be bought for the second half of the year, and conflicting estimates of the amount available for such deliveries. It is certain that the scattered needs of foundrymen not covered for the entire first half will mean some embarrassment before midsummer comes. Locally the failure of foundrymen and molders to agree on minimum wages may become a factor, but a conference between representatives of organized foundrymen and the union molders is looked to to prevent a strike. Southern Ohio furnaces have advanced their price the past week to $17 at furnace. Southern furnaces that are still selling are asking and readily getting $13 at furnace for No. 2 iron. The unwillingness of the furnaces heretofore quoting $12 to sell is not entirely clear, and is thought to point to larger sales than have been generally understood. Practically, therefore, the minimum prices now cut little figure in the market. Gray forge is very scarce and has sold at $16 Valley furnace. Pipe works were large buyers in February and there is now little iron of such grades available. The Bessemer market is very quiet. All Valley furnaces are much behind in their deliveries. We continue Cleveland quotations as follows:

Bessemer	$17 00 to $17 75	Scotch No. 1	$17 25 to $18 25
No. 1 Strong F'dry	17 25 to 18 25	Scotch No. 2	16 75 to 17 75
No. 2 Strong F'dry	16 75 to 17 75	Gray forge, Valley	16 00 to 16 25
No. 3 Foundry	16 75 to 17 25	Lake Superior charc'l	20 00 to 21 00

FINISHED MATERIAL.—Judging from the amount of business that has been done out of store in the winter months the jobbing houses will be an unusually important factor in the trade in the active season. This promises to be true particularly in structural material. Probably at no other time have dealers and construction firms made so large advance purchases of building material and all have such liberal engagements with the mills as to indicate that they will be able to take care of a good share of the building of the coming season outside of the large contracts. So that if the mills make stipulated deliveries to dealers there will not be the necessity for postponing building operations that many have feared. We quote beams and channels at 1.70c, Cleveland, as heretofore, for mill shipments, with strong pressure for an advance by some of the mills. Delivery in eight months is about the best that can now be promised direct from mill. Out of stock material cut to lengths sells at 2½c to 3c. Advances in bar iron and steel bars have been made since the last report. Bessemer steel bars are now quoted 1.68½c Cleveland, and open hearth 1.78½c Cleveland; bar iron, 1.78½c. The price out of stock is still maintained at 1.90c Cleveland. Demand has been steady in ordinary lots; the heavy contracts noted in the past two weeks in this market anticipated the advance. Nothing new is to be reported in plates. Mills are comfortably fixed, but there is no present prospect of an advance in price. Merchant wrought pipe has advanced about 3 per cent in the past week, with demand good. Sheets are active in anticipation of the season of heavy consumption. Galvanized shows more competition than black. Cleveland deliveries on mill shipments are quoted as follows: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27 3.10c to 3.20c, with usual extras for less than carload lots, etc. The range of prices from store is as follows, prices depending on quantity and delivery: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 25-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c. The above are for one pass through cold rolls. For full cold rolled the extra is .10c. Galvanized sheets are quoted 70 to 70 and 10 off list.

OLD MATERIAL.—The market is strong and active and prices are following the advances in pig iron and finished material.

Heavy melting stock is in urgent demand. Machinery cast scrap is higher, as are also iron rails. We quote Cleveland delivery as follows, all gross tons:

Old steel rails, rolling mill lengths	$17 50 to 19 00
Old steel rails, short lengths	16 00 to 17 00
Iron rails	23 00 to 24 00
No. 1. railroad wrought	17 50 to 19 00
Mill scrap	15 50 to 17 00
No. 1. machine scrap	15 00 to 15 50
Machine shop turnings	13 00 to 13 50
Cast borings	7 50 to 8 50
Grate bars	9 00 to 10 00
Sheet iron	9 50 to 11 00
Stove plate	10 00 to 11 00
Car wheels	16 00 to 17 00
Heavy steel scrap	17 00 to 17 50

CINCINNATI.

March 5.

Conditions remain about the same in the iron trade as they have been for the past few weeks. The strong feeling in the market for finished material of all kinds has had its effect on prices and an advance in bar iron and bar steel has been announced. In pig iron the feeling is quieter, according to some interests, while others insist that further advance is certain and that prices are even now low. There is continued buying in all branches and while no deliveries are promised short of third quarter consumers are covering for the remainder of the year.

In the machine tool trade business keeps up very well and there has been some intimation of improvement in the demand from abroad. Taken altogether the feeling is of the best and there is no indication of a change from the strength of the general situation that has been apparent for the past year or more.

PIG IRON.—There are two sides to the pig iron market in this district, and they are both of the producers. It is generally the consumer who cuts half of the figure in the market. Now, however, the consumer is not arrayed against the producer in an attempt to keep the market down. Producers are divided among themselves in their opinions and policy marketwise. One class of producers made up of some of the largest furnaces and furnace interests in the South has been trying to keep the market steady and keep the consumers from forcing it up. This class has used the argument that while the furnaces are largely sold up for the first three-quarters of the year it is also true that the consumers are covered for the same period, and there is no use fearing that there will not be enough iron to meet the demand. The other class maintains that while large interests are keeping the price of Southern iron at the basis of $12 for No. 2, at Birmingham, there is no iron to be had at that price and that the fact that the consumers are ready and anxious to pay $12.50 shows that the other price is too low.

Between the two classes the range of prices quoted continues a wide one. It is not likely that the price of $12 will be advanced, at least while conditions remain the same, and some of the large handlers predict that when the weather opens iron will be plenty enough to "build corduroy roads out of," as one expressed it. Buying goes right along, mostly for delivery during the end of the year. One large firm reports orders in one mail for over 21,000 tons. There is a good demand for car wheel iron and otherwise mostly foundry is being taken. Prices are quoted as follows:

Southern Fdy. No. 1	$15 25 to $16 25	Gray Forge	$13 75 to $14 75
" " 2	14 75 to 15 75	Northern Fdy. No. 1	17 85 to 18 60
" " 3	14 25 to 15 25	" 2	17 35 to 18 10
" " 4	13 75 to 14 75	Southern C.W. iron	20 00 to 20 50
So. Fdy. No. 1 soft	15 25 to 16 25	Malleable coke iron	17 60 to 18 10
So. Fdy. No. 2 soft	14 75 to 15 75		

FINISHED MATERIAL.—The expected advance in bars came today and it is expected that there will be an advance in store prices here to correspond with the advance in the price of the material at the mills. The demand continues very good for all kinds of material, bars leading. Deliveries are getting longer and longer, and it is not anticipated that the advance will have much if any effect in curtailing the demand. Manufacturers of implements, tools, special parts and in fact all consumers of bar iron and steel have been buying so liberally that it is considered that the advance, while made as a measure of self-protection by the producers, will not afford the market the relief that is thought might come.

On the advance the price of bar iron at Cincinnati is made 1.82c, and bar steel is made 1.72c. The store prices on both still remain 2c, but it is expected that when the new mill prices are well established the local association of dealers will advance the store price to 2.10c. Angles, plates and sheets remain unchanged with a good demand for all. Structural material is in good demand and prospects are for a good deal of building.

OLD MATERIAL.—The scrap market is firm and unchanged. The demand for all sorts of scrap is good, rather more car wheel and axle iron being taken than for some time, prices remain:

Old No 1. Wrought Railroad, net tons	$ 16 00 to 16 50
Cast Machine and Foundry, net tons	12 50 to 13 75
Old Iron Rails, gross tons	21 50 to 22 00
Old Steel Rails, gross tons	18 00 to 18 25
Old Short Lengths, gross tons	15 00 to 15 25
Old Iron Axles, gross tons	21 00 to 21 50
Old Iron Car Wheels, gross tons	16 00 to 16 50
Stove Plates, gross tons	9 75 to 10 00
Wrought Turnings, net tons	11 50 to 11 75
Cast Borings, net tons	5 50 to 6 00

PHILADELPHIA.

March 4.

Further interference with transportation facilities by the floods of the past week, has, to say the least, not helped to improve matters at any point. While it is true that consumers have likely suffered as much interruption as producers, yet the situation appears more complicated than ever. It is conceded that the supply of iron for the next three or four months will have to be doled out to consumers in a hand-to-mouth fashion in order to keep everyone going, but at the end of that time it is expected that an easier feeling will prevail. It is pointed out that the advent of warmer weather will give the railroads increased equipment now tied up in other directions and that with this much looked for return of normal conditions furnaces will be in a position to increase materially their output.

PIG IRON.—Prices vary so much that it is hardly possible to show a set of figures which will indicate the actual state of the market. As there is little iron to be disposed of this side of July 1st, transactions covering this period are on a rather small scale. Cases of actual scarcity continue to show up, but in a general way it should be understood that there is not anywhere near the extent of distress as interested parties make it appear. On the other hand, when many of the low quotations are traced up it is found that those making them have no iron for sale. The range of prices for Philadelphia and nearby deliveries during the last half of the year is about as follows: No. 1 X foundry, $18 to $18.50; No. 2 X foundry, $16.50 to $17; No. 2 plain, $16 to $16.50; standard gray forge, $16.25 to $16.75; ordinary gray forge, $15.25 to $16; basic (chilled), $17.50 to $18; Bessemer, $19 to $19.50. As a general rule these figures do not cover any special guarantee as to deliveries during July and August. Where iron must be had before these months, a premium of $1.50 to $2 per ton is exacted, and in many emergency cases even these prices are exceeded.

FINISHED MATERIAL.—Activity continues in all departments and as the operation of many plants has been interfered with through the recent storm there is a chance that more or less delay will occur during the next few weeks. The damage caused will require extra material for repairs and will also tend to bring about the temporary suspension of many mills to fix up their own equipment. The Eastern Bar Iron Association has advanced the price of bars $2 a ton or to a Pittsburg basis of 1.70c. Much work is being held up pending the arrival of structural material and the sheet mills are having their hands full to take care of current demand. Prices are about as follows for city and seaboard deliveries: Plates, ¼-inch and thicker, 1.75c to 1.80c; bars, iron or steel, 1.72½c to 1.80c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—The attempt to place a limit on the prices of scrap material by the principal consumers has evidently failed, as these are now making offers far in advance of the rates which they originally fixed. The market is strong, though business is restricted, owing to unfavorable weather and difficulties of transportation. The range of bids and offers is about as follows for deliveries in buyers' yards: Choice railroad scrap, $21 to $21.50; ordinary light scrap, $13 to $13.25; machinery cast, $15 to $15.75; heavy steel scrap, $18.75 to $19.75; old iron rails, $21.50 to $22.50; wrought turnings, $13.50 to $14.25; cast borings, $8 to $8.50; old iron axles, $25.50 to $26; old steel axles, $22.50 to $23; old car wheels, $17 to $17.25.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.,

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer.
JOHN A. PENTON, Vice-President.
A. I. FINDLEY, Secretary.

A. I. FINDLEY, - - - - - - - - - - - EDITOR.
ROBERT I. CLEGG, - - EDITOR MACHINERY DEPARTMENT.

CHICAGO: 934 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St. D. C. WARREN, Manager.
CENTRAL WESTERN REPRESENTATIVE: R. A. EVANS.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

MARCH 6, 1902.

LIMITATIONS ON ROLLING MILL OUTPUT.

From an economic point of view the most important question which the Amalgamated Association will have to consider in the near future is the limit of output. Nothing in the whole Amalgamated system is more at variance with present day ideas than the practice of arbitrarily restricting production. Were it a matter of limiting the amount of actual work done by the men it would be different, but the limits imposed by the Amalgamated scale are only in the roughest sense limits on the amount of work. In a sheet mill, for instance, the limit is defined by pairs. There is no question that the men can get out one-half more pairs on some orders than they can on others, although the scale limit is the same in each case. In the tin plate scale it is much the same way, as the meager variations allowed from the schedule of number of pounds allowed per turn are so insignificant, in view of the ease with which a given tonnage may be made of one size of product and style of rolling as compared with another, as to fall entirely short of meeting the actual possibilities.

How arbitrary the whole Amalgamated system is may be seen in the fact that the scale for tin plate mills forbids "following out," except on Friday and Saturday, while the scale for sheet mills imposes no restriction. There is no more reason for the existence of this provision in the one scale than in the other. It may be explained that "following out" consists in one crew succeeding the other as soon as the turn's work is done, without regard to the clock, the result being that each crew hurries, and the 16 turns of the week are accomplished in much less than the 5 1-3 days which would be called for by the full period of eight hours to each turn. That "following out" is not more general in sheet mills is due to the opposition of managers who see no advantage in rushing the work when the ultimate output is not increased. The only advantage would be in proving that the work can really be done in less time, and thus leading the way to a demand for a higher limit of output. In a sheet mill that may be cited, however, the practice of following out from the beginning of the week has been in vogue for some time, the management being not as careful as it might be to keep the whole mill going steadily and to watch the quality of the product. The average length of turn in this mill is not over 6½ hours, in which time the full number of pairs allowed by the association is made. The work is all done shortly after noon Friday instead of being prolonged to about noon Saturday.

The men at this mill are no stronger either mentally or physically than other members of the Amalgamated Association. To turn out the work as they do it is harder physically and mentally than to do it where following out is not practiced. In the latter case the men go on duty at the same hour each day during the week. When they leave work they know how much time they have for rest and recreation until they next take charge of the mill. In the mill in question the men sometimes have to wait around the mill for several hours before they begin work, in case the two previous turns have had trouble and have consumed their full 8 hours each. This irregularity of hours and waste of time waiting to start work imposes an extra burden not called for by their duty to their employers. That they are willing to carry it is a good proof that it would be possible for these men to work four turns of 6 hours per day and do in each turn about as much work as they now do in an average of 6½ hours, in view of the fact that in the case supposed they would begin work at the same hour each day and would know exactly at what hour they would be called upon to start work. It would be a decided advantage to the mill referred to if three extra shifts could be put on at the end of the regular 16, to consume the day which the men save each week. It would be a still greater advantage if four turns could be worked instead of three.

In the case of the tin plate scale the limit of output is just as unreasonable. There is perhaps a small class of orders where it is not easy for the men to make the full limit, but there are more cases where to make only the limit is extremely difficult because it is hard to maintain the rolls at the proper temperature and contour. To present a complete system of limiting the output in accordance with the possibilities of the men and the machinery, for the various gauges and sizes which are rolled in sheet and tin mills, would be a herculean task. It would be simply impracticable.

These objections to limiting output, and others that might be cited, are from the standpoint of mill conditions. Beyond them is the broad economic question which is being settled rapidly in every industry, and settled in favor of no limit. To discuss the subject of limiting output in rolling mills is a waste of time. The right is too plain to be argued.

LESSENING FEAR OF AMERICAN COMPETITION.

The "American peril" that to many iron trade commentators in Great Britain has been so real and imminent a thing, is becoming far less portentous as prosperity in this country sweeps on unabated. The fact that a representative of the independent sheet steel manufacturers of the United States sailed from New York last week to engage a large tonnage of foreign steel does more to raise the spirits of British iron manu-

facturess than all the pessimistic literature of the past year has done to depress them. The London *Iron and Coal Trades Review*, which has frequently animadverted with some bitterness on the British free trade policy that gave away in advance every opportunity to invade British markets, and hence had nothing wherewith to barter for trade opportunities, now plucks up courage and declares that British manufacturers have heard more than they care about concerning American superiority and American resources. It believes the American habit of heralding foreign orders has had much to do with the recent scare abroad, and that a habit has been fallen into, without sufficient reason, of deploring British decadence and incapacity. It is now disposed to call a halt on pessimism and proclaims it "the highest of tributes to British capacity and enterprise that, in spite of almost universal protection, and the absence of an open door, this country continues to export a much larger volume of both minerals and manufactured products than any other." We quote further:

We should not probably have said so much that is calculated to stimulate self-complacency in our fellow-countrymen had we not felt that the exhortations given in this journal on previous occasions have been laid to heart, and that we are at last really "clothed and in our right mind" as to our work in the future. Had the diatribes of the daily press been justified, the only possible attitude left to the British manufacturer would have been one of despair. Is there any evidence that this has become the settled complexion of his business? On the contrary, we have not the least hesitation in declaring that from one end of the kingdom to the other the British manufacturer has not only made up his mind to set his house in order, but is actually and persistently and zealously doing it. We know of very few establishments of any importance throughout the length and breadth of the land that either have not already been remodelled and improved, or are now being so; and we are confident that there never was a time when so much was being done in building auxiliary works and plants of every kind. In nearly every case of the kind with which we are acquainted, the design, machinery, and equipment generally are thoroughly up-to-date. Let our labor and transportation conditions be modified, and we shall have but little cause to fear for the future.

All of which is to the purport that the threatened American deluge is not much of a shower after all. It is a tribute to British iron masters that they have taken to heart the lessons read them in the past four years. Yet we believe a rude awakening is in store for some of them when the present high tide of prosperity in the United States begins to ebb. There is a capacity for harm in some of the fittest American plants that is none the less real because the occasion of its demonstration is postponed for a season.

Harvey Musser, attorney, of Akron, O., who bid in the McNeil Boiler Works of that place at the recent sale, represents investors who will soon incorporate a company under an Eastern charter with a capital of $250,000. The works are to be greatly enlarged and the enterprise placed on a substantial basis.

The Youngstown Iron Sheet & Tube Co., Youngstown, O., in a folder just issued refers to its double refined puddled iron sheets. The company manufactures these sheets in gauges 10 to 30, in widths up to 44 inches and in lengths up to 144 inches. They are manufactured as black, painted and galvanized, flat and corrugated. Citation is made of roofing and siding made of puddled iron placed on buildings from 15 to 30 years ago, and now in a perfect state of preservation.

The Republic Iron & Steel Co., Youngstown, O., is planning to add two converters, a blooming mill and soaking pits to its Bessemer plant at Youngstown, O.

CHICAGO PNEUMATIC TOOL CO. BUYS STANDARD PNEUMATIC TOOL CO.

The Standard Pneumatic Tool Co., Aurora, Ill., and its associated companies, the French Standard Pneumatic Tool Co., of Paris, France, and the Standard Pneumatic Tool Co. of Germany, with offices in Berlin, has been purchased by the Chicago Pneumatic Tool Co. of New Jersey, Monadnock Block, Chicago, the exchange being for cash, bonds and stock in the latter company. The deal was concluded at the New York offices of the Chicago Pneumatic Tool Co., 95 Liberty street, last week, the transfer of the Standard company's plants, good will and business having been made March 1. Mr. E. N. Hurley, president of the latter company, retires from the business, and will not hold any office in the combination. Mr. C. W. Mattison, who was a large stockholder in both companies, will become a member of the board of directors of the Chicago Pneumatic Tool Co., and there will probably be other changes and additions to the board.

In an interview with a representative of *The Iron Trade Review* Mr. Hurley stated: "In exchange for the right to manufacture and sell the 'Little Giant' pneumatic tools, manufactured by the Standard Pneumatic Tool Co., we have obtained the right to sell the tools manufactured by the Chicago Pneumatic Tool Co. We took this step for the sole purpose of protecting our customers, as in the recent decision of the United States Circuit Court on pneumatic tool patents, we found it was necessary for the respective companies to exchange their licenses in order to give them virtually the exclusive right to manufacture and sell pneumatic tools."

The Chicago Pneumatic Tool Co. of New Jersey, was incorporated in December last with a capital stock of $10,000,000, of which $2,500,000 was bonds, and $7,500,000 common stock. Of this $2,000,000 of bonds and $5,000,000 of stock were issued. This company took over the business and plants of the Chicago Pneumatic Tool Co., of Illinois; the Boyer Machine Co., Detroit, Mich; the Chisholm & Moore Mfg. Co.'s crane and air hoist department, Cleveland; the Franklin Air Compressor Co., Franklin, Pa., and the Taite-Howard Pneumatic Tool Co., London, Eng.

Colonial Steel Company.

The puddling department of the new plant of the Colonial Steel Co., of Pittsburg, located at Colonia, Pa., was placed in operation last week. The entire puddling department is now operating double turn and the crucible plant, which will contain 192 pots will be placed in operation within two weeks. The puddling mill contains 10 furnaces but these can be increased to 18, and this increase will no doubt be made very shortly. The muck mill and squeezer in this department are also in operation. The rolling mill department will be started within three months. It will contain four merchant mills and four sheet mills. The products rolled on these mills will be high grade and will be used for tool purposes only. The buildings of the plant have the following dimensions: Puddling mill 88x176; boiler house 42x175; electric power house 42x83; crucible plant 128x210; rolling mill 120x640; hammer shop 260x70. Colonia, better known as South Monaca, is located on the Pittsburg & Lake Erie railroad, 24 miles from Pittsburg. In the vicinity of this plant the National Bridge Co. has secured property for the erection of its large structural works and a town of considerable size will spring up around these plants. The owners of this plant were formerly the owners of the plant of Howe, Brown & Co., which was absorbed by the Crucible Steel Co., of America. Offices and warerooms have been established in both New York and Chicago, and a corps of salesmen have been put in the field. The officers of the company are as follows: James W. Brown, president; George A. Howe, first vice-president; T. H. Childs, second vice-president and general manager; Charles M. Brown, secretary and treasurer. The Pittsburg offices of the company are located in the Bank of Commerce Building.

During the month of February the Brown, Bonnell and Valley mills, of the Republic Iron & Steel Co., at Youngstown, Ohio, made records so far as the production of iron is concerned. The total output of these plants amounted to 23,500 tons, which is 77 tons better per day than any previous records.

AGREEMENT ON TIN PLATE AND SHEET MILL EQUIPMENT TERMINATED.

The sheet and tin mill agreements entered into respectively by the American Sheet Steel Co. and the American Tin Plate Co. upon their formation with a number of the large foundries making mill machinery and rolls is about to be annulled by mutual consent. According to present indications the five year agreements, which still have two or three years to run before they expire by limitation will became inoperative before the end of the week.

In the place of these agreements new contracts will be entered into by the respective parties but the protective clause in the former agreement, which prevented the foundrymen from making rolls, tin and sheet mill machinery for independent concerns or new concerns that might enter the field will not be contained therein. This will permit these foundries to manufacture rolls, tin and sheet mill machinery for any of the independent mills now in operation or new concerns that may enter the business in the future. In return for the protection afforded by the five-year agreement both the American Tin Plate Co. and the American Sheet Steel Co. divided up their roll and mill business among the foundries that became parties to these agreements. It is stated on good authority that no bonus was given the foundries for adhering to the protective clause, but prices were paid for material furnished that more than compensated for the amount of business lost in not taking that offered by the independent mills. It is understood that according to the new arrangements the foundries that were parties to the first agreement are to still divide the work of the two big companies between themselves but the ruling market price is to be paid for the material instead of the higher prices which it is understood were paid heretofore.

Since the two agreements were entered into the foundries bound by the same have lost much business that they could otherwise have secured owing to the large amount of new construction in both the sheet and tin mill line. To take care of this new business a number of foundries were organized and succeeded in doing an extensive business with the independent mills. These foundries will not continue to have the field to themselves as the annulment of the five-year agreement means nine additional competitors for tin mill work and fourteen competitors for sheet mill work. The following foundries were parties to both the tin mill and sheet mill agreements: A. Garrison Foundry Co., Lewis Foundry & Machine Co., United Engineering & Foundry Co. (three plants), Mesta Machine Co., Seaman, Sleeth & Co., George A. Hogg Iron & Steel Co., and Mackintosh, Hemphill & Co., of Pittsburg. In addition to the above there were five plants that were included in the sheet mill agreement only.

The Union Steel Casting Co., Pittsburg, underwent some change in ownership this week by the withdrawal of Henry S. Wainwright and Uriah Tinker. Their stock was purchased by C. C. Smith, S. H. Church and George W. Eisenbeis who have been stockholders since the company was organized three years ago. Mr. Church and Mr. Eisenbeis were elected directors at a stockholders' meeting after which the former was elected vice-president and the latter treasurer. Mr. Smith was continued as president, a position he has held since the company was organized.

President Shaffer and other members of the executive committee of the Amalgamated Association have been in New York the past week conferring with officers of the American Tin Plate Co. relative to the tin plate mill scale for the coming year.

The United States Cast Iron Pipe & Foundry Co. has taken an order for 9,000 tons of cast iron pipe for St. Louis at $25.83 per ton.

In the merger of the two hardware specialty manufacturing firms of New Britain, Conn.—the Russell & Erwin Mfg. Co. and the P. & F. Corbin Co.—it is understood that the stockholders of P. & F. Corbin will receive $2,000,000 in the new corporation for their stock, and the Russell & Erwin Mfg. Co. stockholders $2,100,000. P. Corbin will be president of the new company.

LAKE SUPERIOR IRON MINES.

The Barasa mine, Marquette range, is closed down and will be allowed to fill with water.

The Rhoades Mining Co., of Pittsburg, has secured a Delaware charter with a capitalization of $500,000. This new company will represent the ore end of the business of the Cherry Valley Iron Co., of Pittsburg. J. W. Rhoades is president of the new company and R. W. Flenniken, secretary and treasurer. New ore properties have been recently acquired on the Mesabi range, located on the Eastern Minnesota Railroad, and close to the property of the Sharon Steel Co. The company also takes over the ore interests of the Cherry Valley Iron Co. The four Mesabi range properties represent upwards of 30,000,000 tons of ore. Development work will be carried on in the coming season.

The Bradford Mining Co., in which Cleveland and Duluth men are interested, is now opening a mine close to the Chisholm and Clark mines of the United States Steel Corporation, on the Mesabi range.

A valuable find of iron ore on the Vermillion range has just been located by the Minnesota Iron Co., in the swamp south of Tower Junction, Minn., where diamond drills have been at work for the past four months. The ore body lies almost under the main line of the Duluth & Iron Range road and near enough to the Minnesota mines so that it may be worked without additional expense for machinery. The drills have penetrated a body of blue hard ore such as is found at the Minnesota mines nearby, and below this at some depth was found a grade of ore like that of the Chandler at Ely.

Steel Corporation Officers Re-elected.

The directors of the United States Steel Corporation met in New York, March 4, and re-elected President Schwab and all the other officers whose terms expire. Percival Roberts, Jr., resigned his membership in the executive committee. His resignation was accepted, but a successor was not named. He did not resign from the board of directors. Mr. Roberts was president of the American Bridge Co. when it was merged in the United States Steel Corporation.

An adjustment of the difficulties in the brass molding and polishing departments of the National Cash Register Co., of Dayton, O., was reached at New York, March 4, after a two days' conference at the headquarters of the National Civic Federation, between J. H. Patterson, president, and four officers of the company, and E. J. Lynch, president of the Metal Polishers' and Brass Molders' Union; Samuel Gompers, president of the American Federation of Labor, and Ralph M. Easly, secretary of the National Civic Federation.

On April 1 the offices of the Bourne-Fuller Co., of Cleveland, dealers in iron and steel, will be removed to the Hickox building. The company has leased the entire eighth floor of the building.

The Railway Steel Spring Co. perfected its organization at New York last week. The properties taken over were given in our last issue. The following directors were chosen: Aaron French, Pittsburg, president A. French Spring Co.; Samuel R. Calloway, president American Locomotive Co.; Julius E. French, vice-president A. French Spring Co., Charles H. Halcomb, president Crucible Steel Co. of America; Truman H. Newberry, Charles Scott, Charles Scott, Jr., Philadelphia; Frank S. Laying, George B. Sloan, Jr., Frank B. Smith, secretary Crucible Steel Co. of America; S. L. Schoonmaker, formerly of Pittsburg and New York, representative of the H. C. Frick Coke Co. The directors elected: Aaron French, chairman of the board; Julius E. French, president; Frank S. Laying, Charles Scott, Jr., and George B. Sloan, Jr., vice-presidents; Frank Carnahan, assistant treasurer; M. B. Parker, secretary; De Witt Loomis, general superintendent.

The executive committee is composed of Julius E. French, Truman H. Newberry and Frank B. Smith.

The plant of the American Sheet Steel Co., at New Philadelphia, O., was placed in operation last week, after 11 weeks' idleness.

THE WESTERN MACHINERY MARKET.

OFFICE OF *The Iron Trade Review*,
934 MONADNOCK BLOCK.

CHICAGO, March 3.—Manufacturers of machinery in all parts of the West and Northwest report the volume of trade as eminently satisfactory. This condition applies with equal force to machine tool builders, manufacturers of electrical equipment, dealers in second-hand machinery, and manufacturers in other lines of machinery equipment. The consensus of opinion, gathered from reports made to this office and from individual calls is that the foremost question this year will not be so much one of getting orders, as it will be that of making deliveries. Nearly every shop is full of work, many being compelled to run both day and night to turn out their products on time, and a number of concerns report that they contemplate additions to their plants in the spring. There is only one cloud on the business horizon, which is the trouble in getting the raw material. This difficulty is becoming more serious each day, owing to the enormous tonnage mills have on their books, and to the adverse circumstances limiting their output, which confront them and with which they have had to contend for several months. Unless this is relieved, all unite in saying that the output of machinery will be seriously curtailed.

The Ottumwa Iron Works, Ottumwa, Ia., manufacturers of mining machinery, recently furnished for the Chicago & Northwestern Railway Co., at its coal mines at Buxton, Ia., two pair of large hoisting engines. These are of modern design, direct-acting, double-cylinder, double iron drums, of the tangent Corliss bed type; steam cylinders, 18-inch bore, 32-inch stroke; engine equipped with post brakes and balanced valves. The company is also shipping to its California agents a carload of six specially designed engines adapted to the coast trade. It reports the outlook for trade in mining machinery to be better than usual, having a large number of orders and inquiries on its books.

The Ransom Manufacturing Co., Oshkosh, Wis., manufacturer of the Vulcan grinders, informs us that the volume of business in the past month has been very satisfactory. In this period it has received a large number of inquiries and should a reasonable number of them turn to orders, its plant will be kept exceptionally busy during the coming spring. The company recently booked an order from an English firm for three 20-inch water tool grinders, belt driven, and reports it is meeting with good success with the 20-inch electrically driven water tool grinder.

The Marinette Iron Works Manufacturing Co., Marinette, Wis., manufacturer of gas engines and mining machinery, is selling all the engines that it can build. The month of January was the best in point of orders that it has had since the organization of the company, and present indications point to a large business during the coming year. Although it recently doubled the capacity of its works, it finds great difficulty in filling orders on time.

The Stehn Manufacturing Co., Sheboygan, Wis., builder of engines, air compressors and machinery, is crowded to the limit with orders from foundries for air compressors and for its automatic sand blast apparatus which it recently placed on the market. The latest plant equipped with this sand blast apparatus was that of the Rundle Mfg. Co., Layton Park, Milwaukee, Wis., who report they have been able to clean, in some cases, four times the amount of castings that could be cleaned by hand.

The Waterloo Gasoline Engine Co., Waterloo, Ia., has had an exceptional demand for its engines since the first of January, and reports it has been compelled to operate its plant overtime to keep up with orders. During the coming year a greater demand is expected and the company contemplates putting in additional machinery and equipment which will increase the capacity of the works fully 50 per cent. The bulk of its orders come from Iowa and adjoining states.

The Bignall & Keeler Mfg. Co., Edwardsville, Ill., manufacturer of pipe threading machinery, emery surface grinders, etc., states that the amount of business done during December and January was greater by 50 per cent than for the corresponding months of last year, and that from present indications the month of February will show a corresponding increase. Inquiries are numerous, with more than the average percentage of sales. The company looks for a steady business in the coming year, and while the volume may not be so great as for last year it may be more satisfactory. No unusual conditions such as affected business last year are looked for, but instead a steady and increasing demand for machinery of all kinds and pipe threading machinery in particular, owing to the greatly increased use of pipe and tubing.

The machinery business of J. B. Doan & Co., 34 and 36 South Canal Street, Chicago, has been sold to the O. L. Packard Machinery Co., sellers of engines, boilers, mill, foundry and machinists supplies, etc., which will remove its Chicago branch office from 68-70 Canal street to 34 and 36 S. Canal street. Mr. Doan has disposed of the business to accept the position of superintendent in the shops of the American Tool Co., Cincinnati.

Charter Gas Engine Co., Sterling, Ill, states that January and February have met all its expectations in the way of business, and that it is much more a question of filling present orders than of obtaining new ones. The company has orders on its books for three car loads of engines, one for a State on the Atlantic seaboard, one for a State on the Pacific coast, and another for a Central Western State. The company believes the business of the two months of the present year is but an index of what the entire year will be, and to meet the increased trade has purchased property adjoining its plant and will erect new buildings in the spring.

The Vilter Mfg. Co., Milwaukee, Wis., builder of Corliss engines and refrigerating machinery, has closed a considerable number of new orders in the past month. These included 14 refrigerating machines varying from 20 tons to 150 tons capacity, 6 ammonia condensers, 2 plants of direct expansion piping—these to various breweries; two 22x42 Corliss engines to the Port Arthur Rice and Irrigation Co., Port Arthur, Tex.; one 16x36 Corliss engine to the Morris Paper Co., Morris, Ill. The company reports that it has recently shipped a large consignment of machinery for an ice plant to be built at Manila, P. I., also that its new foundry, considered by many to be the most modern and completely equipped in the Northwest, is now in full operation.

H. W. Caldwell & Son Co., Chicago, manufacturer of conveying, elevating and power transmitting machinery, states that trade for this time of the year is unusually large and that it has a large number of orders on its books. The company recently added to its plant a three-story and basement warehouse, 70x160 feet, increasing its floor space about 45,000 square feet.

Stephens-Adamson Mfg. Co., Aurora, Ill., engineers, founders and machinists, have had sufficient orders on their books to run their plant full time all winter, and report that the amount of work ahead insures a busy spring. The company has recently been awarded contracts for the complete power transmission equipment of three large manufacturing plants in the South, and its general mail order business in the line of power transmission, elevating and conveying machinery is most satisfactory. It anticipates that the great question this year will not be so much that of getting new orders, but making deliveries.

The Chicago Pneumatic Tool Co., Monadnock Block, Chicago, states that the number of orders received in December of last year exceeded the total of any previous month, and that the January business (since the reorganization) was 50 per cent greater than that of December, the total orders in this month amounting to 850. Included in this figure are 15 orders for compressors and 25 orders for cranes and hoists. Among the compressor orders are seven from the Lehigh Valley Ry., one from the Norfolk & Western Ry., and three from San Francisco. Among the larger orders for tools are 80 from the Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia; 50 from the American Car & Foundry Co.; 25 from the Pressed Steel Car Co. This company has Eastern offices at 95 Liberty street, New York, besides maintaining branch offices in all principal cities throughout this country and abroad, the main office in Europe being at 63 Queen Victoria street, London. From a small beginning seven years ago it has grown to a concern which owns and steadily operates four large plants in the United States and one in England. Besides the Boyer and Olney Works at Detroit and Philadelphia, formerly owned by it, the company acquired in the consolidation effected in January, the air

compressor works of the New York & Franklin Air Compressor Co., Franklin, Pa., and the pneumatic crane plant of the Chisholm & Moore Mfg. Co., Cleveland, Ohio, as well as the plants of the New Taite Howard Co., London, Eng.

Pawling & Harnischfeger, Milwaukee, Wis., manufacturer of electric cranes, reports that among the orders received in the past month, was one from the Allis-Chalmers Co., Chicago, for 35 cranes ranging in capacity from 5 to 75 tons. These will be installed in the new works at Allis, a suburb of Milwaukee. In addition to this it has booked orders for 43 electric cranes, among which are the following: Aultman & Taylor Machinery Company, Mansfield, O., 10-ton; La Belle Iron Works, Steubenville, O., 10-ton; McMyler Mfg. Company, Cleveland, 10-ton; Glamorgan Pipe & Foundry Company, Lynchburg, Va., 15-ton; Wheeling Steel & Iron Co., Wheeling, W. Va., 7-ton; Lorain Steel Co., Johnstown, Pa., four 7-ton; Baltimore Copper Smelting & Rolling Co., Baltimore, 5-ton; Midvale Steel Company, Philadelphia, one 10-ton and two 5-ton jib; C. W. Hunt Co., West New Brighton, N. Y., 2½-ton.

MERITS AND DEMERITS OF CAST IRON CAR WHEELS.

At the monthly meeting of the Railway Club of Pittsburg, held at the Hotel Lincoln on Friday afternoon, Feb. 28, there was an interesting discussion regarding the merits of the cast iron wheel for freight and passenger service, as compared with the steel tired and the proposed forged steel wheel, patents on which have already been secured, and production being promised within a year at a plant to be erected in Pittsburg. At the January meeting of the club a paper was read on the advantages of the steel tired wheel and a number of manufacturers of cast iron wheels attended last week's meeting to speak in support of their product. One of the arguments against cast iron wheels was that these wheels were not absolutely round and that the circumferences of wheels on the same axle often vary to a considerable extent. In addition it was stated that many accidents that occur today are directly attributable to the cast iron wheel. Another argument brought out in this paper was that the weight of the cast iron wheel was against it, especially with the constantly increasing loads carried in the big steel freight cars of today.

The criticism against untrue wheels was disposed of by one manufacturer, who stated that all cast iron wheels are cast against a chill, which is an absolutely perfect circle of metal, thus preventing the casting of anything but a true wheel. With reference to wheels on the same axle not being of exactly the same circumference, it was stated that all wheels will vary in circumference to some extent and for this reason are assorted at the wheel foundry and mated. This duty discharged, the responsibility of the foundryman ends and it is the duty of the railway or truck machine shop to keep the wheels mated when placing them on axles. It was admitted that a slight variation in circumferences would naturally result in the dragging of the smaller wheel to some extent, but rarely if ever are wheels cast in the same molds more than one-eighth to one-quarter of an inch off in circumference, which is considered close work, when the constantly varying conditions which prevail in any foundry are taken into condition.

With reference to increasing the weight of cast iron wheels Mr. F. A. Slocum of the Keystone Car Wheel Co. said that the steel tired wheel with the same circumference as that of the present standard cast iron wheel weighs from 350 to 400 pounds more and is not called upon to perform any different service when used under passenger coaches and freight cars than the cast iron wheel. In addition he said that the heaviest cast iron wheel in use today weighs only 700 pounds and is the type used under the 100,000-pound capacity steel freight car. The 600-pound cast iron wheel and 650-pound standard type have been used and are now in practice under the 60,000 and 80,000-pound capacity car. But even with the great difference in the capacities of the cars, the maximum increase in the weight of the cast iron wheel has been but 100 pounds within recent years, and in heavy wheels but 50 pounds. The load has increased 80 per cent, the weight of the axle 100 per cent, and the weight of the wheel 8 per cent. And in spite of this small increase in the weight of the cast iron wheels, they continue to make great records under the monster freight cars of today.

It was also argued that while the first cost of the steel tired wheel is greater, the service to be obtained therefrom and the greater wearing qualities more than compensate for the increased first cost. Figures produced did not bear out this assertion, however, as it was shown that the average life of some steel tired wheels used under 100,000-pound freight cars was 32 months; under 80,000-pound cars, 46 months, and under 60,000 pound cars, 52 months. On the other hand the cast iron wheel is guaranteed to last 5 years or for a distance of 70,000 miles. The average cost of a steel tired wheel, it was shown, was $45, while the 700-pound standard type cast iron wheel is sold to the railroads for $10. The chairman of the meeting stated that inasmuch as there are 1,500,000 freight cars in service in the United States almost all of which are equipped with cast iron wheels, there must necessarily be 12,000,000 wheels in service under freight cars. To equip all these cars with steel tired wheels would cost the railroads of the country $480,000,000 and he expressed his doubts about an appropriation for this expenditure being made in the near future at least.

It was also stated by one of the speakers that out of a total of 100,000 car wheels scrapped on his road the average distance covered by each wheel was 80,000 miles and of all the wheels removed 33 per cent were taken out of the service on account of cut flanges, this being due to imperfect frogs and crossings.

Frank A. Wheeler, the inventor of the pressed steel car wheel, presented a short paper in support of his type of wheel. The center of the wheel is forged after the steel blank has been pressed, while the flange of the wheel is rolled. Although it is claimed by the inventor that the cost of the wheel will be less than that of the cast iron wheel, this was questioned on account of the many processes through which this wheel must pass before being completed. The surface is to be tempered, the tempering to take the place of the chilling of the cast iron wheel. A plant for the manufacture of this wheel will be erected in the Pittsburg district within a year.

Exciting of "Pleasant Emotions" a Patent Requisite.

The United States Court of Appeals has had to pass upon a design patent granted upon a horseshoe calk. The learned judges score the practice of the Patent Office as being not only liberal but lax in dealing with applications for design patents and say that "utility (in these cases) depends upon the pleasing effect imparted to the eye and not upon any new function." "Design patents refer to appearance, not utility. Their object is to encourage works of art and decoration which appeal to the eye, to the esthetic emotions, to the beautiful. A horseshoe calk is a mere bit of iron or steel, not intended for display, but for an obscure use and adapted to be applied to the shoe of a horse for use in snow, ice and mud. The term 'useful,' in relation to designs, means adaptation to producing pleasant emotions. There must be originality and beauty. Mere mechanical skill is not sufficient." And the record failing to show that the aforesaid calk had excited "pleasant emotions" even in more susceptible material than the legal authorities then in council, the appeal was dismissed.

The Brillion Iron Works, of Brillion, Wis., has been incorporated with $25,000 capital by Henry Ariens, John Thompson and Joseph Wolfinger.

The Standard Pneumatic Tool Co., Aurora, Ill., has appointed J. B. Wilson, formerly connected with the mechanical department of the Grand Trunk Railway, manager of its Canadian office, with headquarters at 103 Union Station Arcade, Toronto, Can.

E. Langford Adams, assistant to the president of the Sargent Co., Chicago, died of pneumonia Jan. 31, at the home of his parents in Chicago.

The Fairbanks-Morse Co. Chicago, has let contracts for machinery and tools for its plant at Beloit, Wis., amounting to $30,000. Hill, Clarke & Co., secured about $18,000, and the rest were scattered among various concerns.

A NEW ELECTRICALLY DRIVEN PORTABLE KEYSEATER.

The machine shown was built for the Newport News Shipbuilding & Dry Dock Co., for use in the keyseating of marine shafting and has recently been put in operation at their plant. It puts an end to the tedious task of chipping a keyseat in a heavy shaft and does the work in much less time, leaving of course a far better result under average conditions. The machine is shown in Figs. 1 and 2 as rigged up for the cutting of a large shaft, the views being taken from opposite sides of the work. The device consists of a stout saddle in the shape of an inverted V and attached to the shaft by links tightened by the long screw extending below the cross piece under the work. The links are of a well known standard type and the belt may be extended by the addition of these elements to grip the largest diameter, the V groove in the saddle bringing the machine in line with the axis of the shaft. A slide passes through the saddle, carrying at the end a cutter head having a vertical adjustment by means of the hand wheel; this having graduations for micrometer readings.

The milling cutter is driven by a Renold silent chain directly from the armature shaft of the motor which is mounted on the slide. The Renold chain was recently described in *The Iron Trade Review*, and the peculiarities of its construction need not be repeated here. There is a gear on the end of the cutter

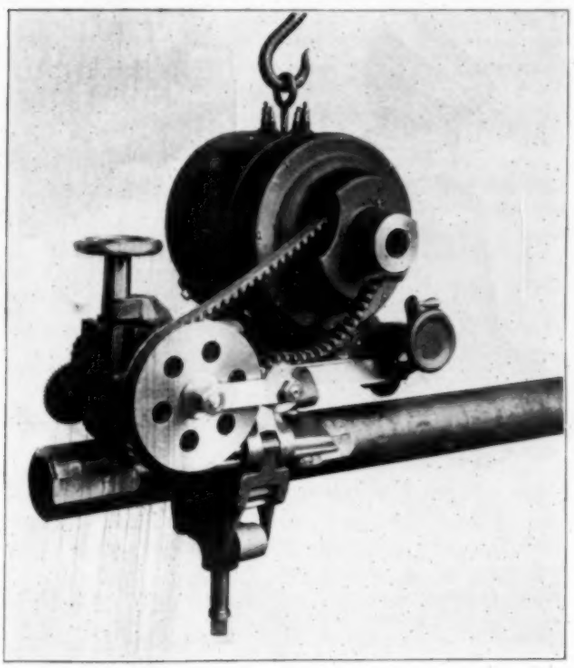


FIG. 1.—ELECTRICALLY DRIVEN PORTABLE KEYSEATER.

arbor which meshes into another gear attached to a sprocket and by means of a chain this motion is conveyed to the other end of the slide to a worm and gear driving the feed screw. The worm and gear are held together by a trigger which is tripped when the desired length of cut has been reached, this distance being adjusted by a movable collar on a rod which operates as the slide passes through the saddle. This connection of the feed gearing (sprockets, gears and chain is shown very clearly in Fig. 2. The other view, Fig. 1, illustrates the connection between the motor and the cutter, the cutter head having been raised to its highest position above the shaft and the chain is quite slack owing to the approach of the two shafts. The shrouded wheels and the idler prevent any chance of the chain leaving the sprockets, and the formation of the teeth gives good results under these unusual conditions for chain trasmission.

The machine illustrated weighs about 350 pounds and is handled by a crane. When not in use it may be left in any out of the way place and when wanted it may be easily picked up and set upon the shaft, this machine being equipped for an 18-inch shaft. It is supplied with cutters for milling keyways up to 3 inches wide and will cut about one inch deep. The proper depth is first reached by the hand feed and then the longitudinal feed is thrown in and the machine is drawn into and through the saddle cutting the keyway as it goes. When the desired distance has been traversed the feed is thrown out of gear by the automatic stop. The machine will cut about ten inches before it is necessary to shift it along the shaft. By repeated shifts any length of keyway can be cut as the machine is so constructed that the keyway will always be true and it takes but two or three minutes to move the saddle and start another chip. The motor is a 2-h. p. wound for 220 volts. Size and voltage are dependent upon the shop requirements, and may be changed to suit local conditions. The motor and the rest of the moving parts are above the cutter and the work may be flooded with oil without danger to the electrical apparatus or the introduction of gritty matter or chips into the bearings of the machine.

The machine was built by the John Leisenring Mfg. Co., of Philadelphia.

Dismantling Lackawanna Rail Mill.

The last rails were rolled at the South Works of the Lackawanna Iron & Steel Co., Scranton, Pa., last week, and the work of dismantling the rail mill is now well under way. The dismantling of the Scranton plant was commenced sev-

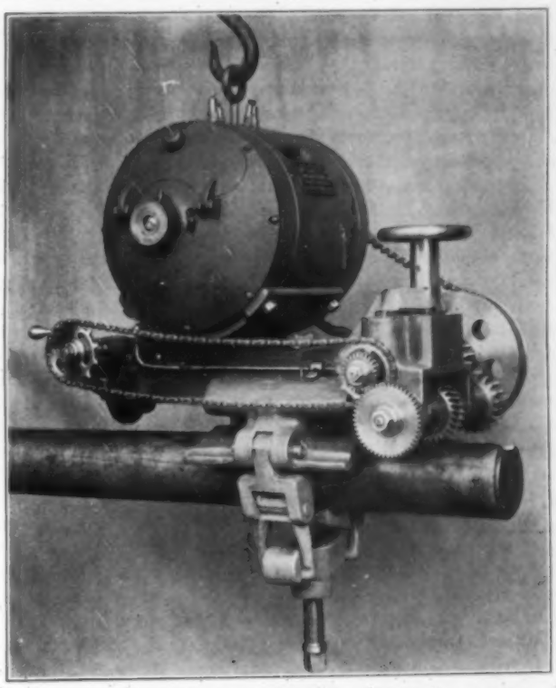


FIG. 2.—ELECTRICALLY DRIVEN PORTABLE KEYSEATER—VIEW FROM OPPOSITE SIDE OF SHAFT.

eral months ago, and last week the work had progressed up to the rail mill and its necessary equipment. The Lackawanna Iron & Steel Co., which operated the South Works, was organized through the consolidation of the Scranton Steel Co. and the Lackawanna Iron & Coal Co.

The latter corporation was the historic predecessor to the Scranton Steel Co., which was organized by William W. Scranton. He resigned as general manager of the Lackawanna Iron & Coal Co. in 1882, and, forming a corporation with a capital stock of $750,000, erected the South Steel works, which started operations in 1883. The first blast of the Scranton iron industry was put on the furnace by William Henry, on Jan. 3, 1842. The early work was done under a limited partnership formed by Seldon T. Scranton, Joseph H. Scranton, Joseph C. Platt, George W. Scranton, Philip H. Mattes, Edward Mowrey and John Holland. The Lackawanna Iron & Coal Co. was finally incorporated in 1853, and took over the business of the limited partnership, which was known by the firm name of Scranton & Platt. The Lackawanna Iron & Coal Co. had a capital stock of $3,000,000, which, added to the Scranton Steel Co.'s stock in the consolidation made the Lackawanna Iron & Steel Co.'s incorporated capital $3,750,000, which was, a little over a year ago, increased to $20,000,000 in order to erect the plant at Buffalo.

PERSONAL.

John Stevens, superintendent of the Midland plant of the American Sheet Steel Co., at Muncie, Ind., has resigned. He has accepted a similar position with the Inland Steel Co.

Peter Gordon has been appointed superintendent of the Bessemer plant of the Republic Iron & Steel Co., at Youngstown, O. Percy Mackey will succeed Mr. Gordon as superintendent of the blooming mill.

Charles L. Thompson has been appointed assistant superintendent of the mills of the Republic Iron & Steel Co. in the Youngstown, O., district. He will be assistant to Thomas Parrock. Mr. Thompson has been associated with the American Steel Hoop Co.

J. Clark Kirkpatrick has been elected president and general manager of the Pittsburg & Lake Superior Iron Co., to succeed his late father. The headquarters of the company are at Negaunee, Mich.

E. A. Henry, president of the Cuyahoga Steel & Wire Co., Cuyahoga Falls, O., has been elected president of the Hartman Mfg. Co., New Castle, Pa.

W. H. Mairet, formerly commercial freight agent of the B. & O., with headquarters at Akron, O., has accepted a position with the Star Drilling Machine Co. at the same place.

Thomas Stitt has resigned a position with the U. S. Government as inspector to become steel inspector for the Carnegie Steel Co., at the Duquesne plant. Before becoming connected with the government he was employed in a similar capacity at the Homestead plant. A. H. Hight, chief of the shipping department at Homestead, has been transferred to the purchasing department at Pittsburg.

John W. King, who has been stationed at the plant of the Carnegie Steel Co., as inspector for the R. W. Hunt Co., of Chicago, has gone to Sydney, N. S., to inspect steel for the Continuous Rail Joint Co. of America. L. C. Packham, formerly connected with the Michigan Malleable Iron Co., has been appointed manager of the Grand Rapids Malleable Co., of Grand Rapids, Mich. Mr. Packham succeeds I. Preston Rice, who recently resigned on account of ill health.

A. L. McClurg, who for six years has been an expert on water purification for boilers for the Harrison Safety Boiler Works, Philadelphia, Pa., has become assistant to Edward F. Austin, manager of the Pittsburg office of the Stilwell-Bierce & Smith-Vaile Co., of Dayton, O.

O. D. Hogue, formerly manager of the Good Roads Machinery Co., and later in charge of sales and credits for the Aultman Co., Canton, O., has tendered his resignation to the latter company, taking effect March 1, 1902. Mr. Hogue will become vice-president and general manager of the Pittsburg Co., of Pittsburg. It is largely engaged in industrial and real estate operations at Ellwood City, Pa., at which point Mr. Hogue will make his headquarters.

Charles T. Boynton, formerly president of the Shelby Steel Co., has become a member of the firm of Pickands, Brown & Co., Chicago, pig iron dealers, by purchasing the interest in the company of the late Major Pickands. Prior to his election to the presidency of the Shelby Steel Tube Co., Mr. Boynton was for a number of years Western representative of Washburn & Moen, and when the American Steel & Wire Co. was organized he was appointed general sales agent, with offices in Chicago.

T. H. Simpson, manager and treasurer of the Michigan Malleable Iron Co., Detroit, Mich., has sailed for Europe.

George M. Bard, who recently resigned his position as general superintendent of the Republic Iron & Steel Co., has been elected vice-president and general manager of the Diamond State Steel Co., Wilmington, Del. Prior to the organization of the Republic Iron & Steel Co. he was treasurer and manager of the Indiana Iron Co., at Muncie, Ind.

In 1867 Messrs. Shickle and Harrison established a business which was incorporated in 1881 as the Shickle, Harrison & Howard Iron Co., of St. Louis, Mo., for the manufacture of structural iron and cast iron gas and water pipe. In 1899 they began to build a large modern steel casting plant at East St. Louis. The company is about to enter different lines, and it has recently been organized on a larger scale. The new organization has taken the name of the young men in charge, and is known as the Leighton & Howard Steel Co.

NEW PLANER JACKS, LATHE DOGS AND DRILL HOLDERS.

The planer jack illustrated in Fig. 1, is a handy, substantial device for leveling work on the planer, milling machine, shaper, etc. It is intended to take the place of the haphazard and usually uncouth devices frequently in use for leveling work on machine tools. Time is as much an essential in preparing the work as in the later cutting operations and a set of these tools on a machine will greatly reduce the proportion of time required for preliminary arrangements as compared with the actual machine work on the job and will, by their solid and adjustable features produce excellent results. The base is substantially made of malleable iron, faced true on the bottom. It is of stout design, an important item being the split hub and screw (case hardened) providing means for locking the jack screw in position and compensating for the wear of screw and socket. The tilting cap is of malleable iron, faced on the top, and is attached to the head of screw by a ball and socket arrangement which allows it to be self-adapting to uneven, irregular or angular surfaces. The screw is made of steel with

FIG. 1.—ARMSTRONG PLANER JACK.

FIG. 2.—ARMSTRONG CLAMP LATHE DOG.

U. S. standard thread and has a hexagon neck for wrench. The jacks are made in four sizes having a respective range from 2¾ to 3¾ inches, 3¾ to 5¼ inches, 5¼ to 7½ inches and 7½ to 12 inches.

The dog shown in Fig. 2 is so constructed as to combine the convenient features of the clamp dog with the simplicity and strength of the ordinary lathe dog. The formation of the jaws will hold any shape securely and are especially serviceable for use on finished surfaces which would be liable to be damaged by the setscrew of a common lathe dog. The sliding block is drawn up to the work by a freely adjustable steel

FIG. 3.—ARMSTRONG REAMER AND DRILL HOLDER

U-bolt with loosely fitted case hardened nuts so that they may be run rapidly to size without using a wrench until tightened. The body of the dog is made of cast steel and the general design has no projecting screws or other parts liable to catch the file or the hand or clothing of the workman. One advantage of the device consists in the capability of adjustment without removing the work from the centers. The seven sizes in which the tool is now made have a wide range of adjustment and are nicely proportioned and balanced to take work from ⅛-inch to 5 inches in diameter.

Fig. 3 is a clamp drill holder designed for straight shank drills, reamers or similar tools and will handle them securely in lathe work or other service of that class with safety to the operator. The construction is similar to that of the lathe dog at Fig. 2. The handle is polished and rest of tool neatly painted. The tool is made in four sizes having a capacity from ¼ to 1 inch, ⅜ to 1½ inches, ½ to 2 inches and ¾ to 3 inches.

All the above specialties are manufactured by the Armstrong Bros. Tool Co., Austin Ave., Chicago.

IRON AND STEEL WORKS OF THE UNITED STATES.

The 15th edition of the Directory of the Iron and Steel Works of the United States presents a striking record of the changes that have come over the iron industry in the nearly four years since the publication of the last Directory. In the Directory for 1898 there were described 420 blast furnaces then active or reported as likely at some time to be active. It was stated, however, that about 50 of these would probably never make iron again. In the present edition 406 furnaces are listed, but the number that should be classed as live is considered by General Manager Swank to be less than 400. Many of these are of the largest capacity in the world. The total annual capacity is put at 24,000,000 gross tons, as against 18,000,000 tons in 1898. Since 1898, 58 furnaces have been transferred to the abandoned, dismantled or inactive list. In 1898, when the Directory appeared, 4 furnaces were being built; today 12 are in course of erection—2 in New York, 1 in New Jersey, 3 in Pennsylvania, 1 in West Virginia, 2 in Alabama, 1 in Michigan and 2 in Colorado. Of the 406 furnaces now listed, 55 use charcoal, 5 mixed charcoal and coke, and 346 anthracite and bituminous fuel. In 1898 there were 79 charcoal furnaces and 341 using anthracite and bituminous fuel. The annual production of charcoal pig iron is not decreasing, though relative to coke and anthracite iron it is less than in 1898. The average annual capacity of charcoal furnaces in 1898 was 12,119 gross tons; today it is 14,179 gross tons; annual capacity of mineral fuel furnaces in 1898, 53,150 tons, against 69,252 tons today. The above data are from the preface to the new Directory. From its summation of steel works, rolling mills, etc., we extract the following:

Rolling Mills and Steel Works.—The Directory for 1898 enumerated 504 completed rolling mills and steel works and 4 under erection. The present edition enumerates 527 completed rolling mills and steel works, 28 under erection, and 1 being rebuilt, making a total of 556. In addition the Directory mentions 1 plant to be rebuilt and 6 plants projected.

Puddling Furnaces.—Puddling furnaces in April, 1898, each double furnace counting as two, 3,889; in November, 1901, 3,251. The highest number of puddling furnaces was in 1884, 5,265.

Bessemer Steel Works.—The total number of completed Bessemer steel works in April, 1898, including 2 Clapp-Griffiths plants and 1 Robert-Bessemer plant, was 45, and the whole number of converters was 100. In November, 1901, there were 35 standard Bessemer steel works with 81 converters, 1 Clapp-Griffiths plant with 1 converter, 2 Robert-Bessemer plants with 3 converters, and 9 Tropenas and "special" Bessemer steel plants with 15 converters; total number of Bessemer plants, 47; total number of converters, 100, the same number as in 1898. The increase in the number of small Bessemer plants is noteworthy. Since April, 1898, seven standard Bessemer plants have been placed on the retired list. The annual capacity of the completed Bessemer converters in April, 1898, was 10,633,000 gross tons; in November, 1901, the capacity of the built and building converters was 12,998,700 tons.

Open-Hearth Steel Works.—The Directory for 1898 described 99 completed open-hearth steel plants, with 281 completed furnaces; the present Directory 112 completed plants, with 403 completed furnaces. In 1898 no new plants were being built. In November, 1901, 12 open-hearth plants with 40 furnaces were building, 1 plant was to be rebuilt, 13 plants were projected, and 6 furnaces were being added to existing plants. The annual capacity of the 403 completed and the 46 building open-hearth furnaces, in ingots and direct castings, in November, 1901, was 8,289,750 gross tons, against 3,522,250 tons of the completed furnaces in 1898. Of the 99 completed open-hearth plants in April, 1898, 43 were prepared to make basic steel, and of 10 open-hearth plants then projected, a majority were basic. In the present Directory 167 open-hearth furnaces are described as making acid steel and 236 as making basic steel; total, 403. The acid furnaces have an annual capacity of 1,874,650 gross tons of ingots and castings; the basic furnaces, 6,415,100 tons.

Crucible Steel Works.—In November, 1901, there were 45 completed crucible steel plants, 3 building, and 1 plant projected. The number of pots in the completed plants was 2,896, and the aggregate annual capacity of these plants was 175,000 gross tons of ingots and castings.

Steel Castings.—In 1898 there were 47 open-hearth plants which were prepared to make steel castings, and in November, 1901, there were 56, besides increases in capacity of many old plants. The production of open-hearth steel castings has greatly increased, and the number of small Bessemer plants has also increased since 1898, all of which make steel castings. Steel castings are also made by 14 crucible plants.

Rail Mills.—The Directory for 1898 showed 51 rolling mills prepared to make standard, girder, light T, and other iron and steel rails. The present edition enumerates 45 completed rail mills and 3 building.

Structural Mills.—The whole number of works now equipped to manufacture some form of rolled structural material, including beams, beam girders, zee bars, tees, channels, angles, bridge rods, building rods, plates for bridge work, structural tubing, etc., is 67. This branch has made marvelous progress. It has been a leading factor in the development of the open-hearth steel industry and in the enlargement of the Bessemer steel industry.

The present Directory shows 223 plate, sheet and skelp mills, besides 13 building and 2 projected, against 230 completed, 2 building, 1 partly built and 1 projected in 1898. Tin plate works numbered 69 in April, 1898, with 1 building and 1 projected; at the close of 1901 there were 55 plants, beside 7 building and 1 projected. Cut nail and spike works numbered 55 in 1898; in 1901 there were 43 with 3385 machines against 4544 machines in 1898. Wire rod mills in 1898 were 24, and 1 projected; in November, 1901, 32 completed, 4 building, 1 rebuilding and 1 projected. Wire nail works in 1898, 79, and 1 building; today, 64, besides 3 building, 1 rebuilding and 1 to rebuild. There were 10 pig and scrap iron bloomaries not connected with rolling mills, in 1898, several of these being idle; in 1901, 8 nearly all active. One forge in New York makes blooms direct from ore; one in North Carolina is idle.

The Directory for 1898 showed 94 complete iron and steel works using natural gas and 2 building. Of the 96, there were 41 in Allegheny and 21 in other parts of western Pennsylvania, 7 in Ohio and 25 in Indiana. Today the total is 110 works with 7 building, including 43 with 2 building in Allegheny county, 24 completed and 4 building in other parts of western Pennsylvania, 11 in Ohio and 22 in Indiana.

Canada now has 14 blast furnaces, with 4 building and 4 projected. The 14 furnaces have a capacity of 958,000 gross tons of coke pig iron, 7,300 tons of charcoal and coke, and 125,000 tons of charcoal pig iron; total, 1,090,300 gross tons. Canada has 18 completed rolling mills and steel works and 2 building. Four steel works make open-hearth steel, 1 Bessemer in a special converter and 1 Tropenas steel. Two standard Bessemer and 1 open-hearth plant are being built. Bessemer capacity built or building, 301,400 gross tons a year; open-hearth, 537,000 tons. Total 838,400 tons. The annual capacity of the rolling mills is 981,900 tons.

The new plant of the Buckeye Malleable Iron & Coupler Co., which is under erection in the South End of Columbus, O., is fast nearing completion. The main foundry building is 800x135 feet, while the auxiliary building is 500x100 feet. The pattern shop is 250x50 feet. This plant will be devoted largely to the production of steel castings, although there will be a coupling department similar to that in the company's other plant at Columbus.

The town of Marietta, O., is now assured of the erection of a tin plate and sheet plant as the requisite number of lots, prescribed by the promoters have been disposed of.

A. M. Crane & Co., The Rookery, Chicago, have been appointed exclusive sales agents for the United States for the light iron rails manufactured by the Ohio Steel & Iron Specialty Co., Cuyahoga Falls, O.; also sales agents for billets and steel bars made by the American Rolling Mill Corporation, Chicago.

The firm of Price, Waterhouse & Co., St. Louis, Mo., has been appointed auditor for the United Steel Corporation.

R. D. Nuttall & Co.'s System of Cost and Work Records.

The plant of the R. D. Nuttall Co., Pittsburg, was described in some detail in *The Iron Trade Review* of Nov. 14, 1901, and considerable attention was then given to the shop arrangement and machinery. The company has made a specialty of gearing, and gears are manufactured in factory style, the provision made for the rapid repetition of cutting operations in gears of all practicable sizes being essentially modern and complete. Lubricant is piped off with the same thoroughness that gas or electricity would be conveyed through the average shop, and being distributed under pressure it has an effect that allows a cutting rate of remarkable speed. The cutters rout out the teeth of steel gears and pinions for street railway service at a gait that is surprising to the eye of the machinist accustomed to ordinary processes in this line of work. The firm has an all-around range and facilities are at hand for the production of all grades of gearing, from the common level of the standard established by keen competition among manufacturers of railway equipment to the originated teeth desired in some high quality machinery where methods of precision are requisite. The patterns may be made by the R. D. Nuttall Co., or by the firm to whom the finished product is to be shipped; and the former company can start from the rough sketch and supply the complete gearing or the purchaser may prefer, if time permits and his facilities are capable of meeting the demands, that the teeth only shall be cut outside his shop, and the pattern-making, casting, boring and turning are in that case performed before the work reaches the Nuttall plant. It follows, therefore, that any combination of these operations may be done by the one company or the other and that even the orders for the one gear can at different times be varied by the purchaser in his requisitions upon the gear cutting concern.

It will also be understood that the bulk of the work is of limited dimensions and that extreme sizes are the exception, of course. The variations with gears of moderate proportions involve a vast amount of detail work in the shop in addition to the several chances for variety in the operations already enumerated. The material, number of teeth, the pitch, the width of face and diameter of bore are all capable of variation at the pleasure of the designer and this lack of standard proportions leads in many cases to an equally complicated system in handling this work in shops.

A Flexible System Demanded.

The first impression made by a visit to a plant handling so varied and numerous a product is a realization of the complexity of the office mechanism to cope with this condition. It is very evident that no general treatment will handle the question with the desired expedition and efficiency, yet the system must have sufficient breadth and elasticity to meet the uneven requirements of every day service. Anything else would fall short of the mark and end in a slipshod method that would demoralize the efforts of the office force and lead to endless confusion from foundry to shipping clerk, and the pattern maker and the purchaser would be the terminal points of a chain of discontent.

There is no need of describing the time-keeping system of the R. D. Nuttall Co. or some of the other features which are common in well regulated establishments manufacturing machinery or component parts, as in this instance, and only such peculiarities of the office work have been selected for description as would illustrate the compact and ingenious method the company has employed for the solution of some productive problems. These problems have been briefly outlined in the above introduction and the accompanying illustrations clearly show how these have been met. The engravings are exact reproductions of the card, record and order forms, and careful attention has been paid to the illustrations in order to exhibit the difference between the printed blank and the subsequent typewritten additions, the checking and the endorsement of the pattern maker, the shop foreman, cost clerk, etc. It will be understood, however, that the engravings are not copies of original entries for work actually undertaken by the R. D. Nuttall Co., and are only to be interpreted as giving more definitely the purpose of the methods than an attempt at copying an original series from the forms actually in use. The several leaves are punched for insertion in a file or for binding in the familiar form of the loose-leaf ledger; the shop order, office copy, shipping blank, etc., being of different colors and are easily distinguished, assorted, typewritten, or filed with convenience and dispatch, as there is not required any tedious examination and consequent loss of time by a clerk competent for a better class of employment or the misjudgment of a less capable assistant. Only color blindness of an extreme character could excuse the merest tyro of an office boy in mixing up the blanks used for the different departments.

No. 16 MATERIAL. Miscellaneous Gears

Date. 1901	Requisition No.	Pattern No. or Size	Number Ordered.	WHERE ORDERED.	MATERIAL RECEIVED.					Completed	Date. 1901	Our Order No.	Material.	Number Ordered.
10-30	86440	2642	16	Phoenix Bronze Co	8 11-4 49	4 11-5 25	4 11-7 23			✓	10-30	24641	Bronze	16
	86441	1¾x1" Brass Rod	36"	McKenna Bros. Brass Co	1 11-2 26					✓			"	16
	86440	2643	16	Phoenix Bronze Co	6 11-5 280	10 11-7 516				✓			"	16
	86442	2646	4	Marion Steel Casting Co	4 11-21 4510					✓		24646	C.S.	4
		25Tx8¾	4	Bryenne Forge Co	4 11-16 2409					✓			F.S.	4
10-31	86445	2650	2	Elvin Foundry Co	1 11-4 16	1 11-6 18				✓	10-31	64650	C.S.	2
		✓		Stock									F.S	2

FIG. 1.—CLASSIFIED ORDER, MATERIAL AND SHIPPING BOOK.

An Order, Material and Shipping Book.

The foundation of the whole system is the classified order, material and shipping book which is illustrated in Figs. 1 and 2. A section only of each page is shown, the full size of either Fig. 1 or 2 being 14x17 inches. The lines are ruled with different colors of ink and every fourth horizontal line is slightly broader than the rest as indicated in the illustrations, the heavy line being used to separate the orders and allow sufficient space for complete entries of dates, etc. The book is in effect a ledger account of the debit and credit of material, with the necessary detail of the dates as ordered, received, completed and shipped. The nature of the material, the quantity, dimensions, etc., are all clearly set forth and

the work may be considered as on the one side debited to the shop until the completed shipment, when the account is balanced and the transaction is at an end so far as its productive side is concerned.

The complete character of the record in a single book in so concise a form is exceedingly neat and correspondingly valuable. There is a check there against that wasteful precaution which believes in ordering stock enough to make up any possible deficiency due to foundry ill luck, poor castings or machine shop blunders. The office can at any time keep track of the material as it accumulates and a trial balance be obtained. There is here a means of reaching a stock inventory and holding the shop responsible for all the goods delivered. If the system under consideration had no other merit than the maintenance of the casting and stock accounts in proper proportion to the demands of the shop—neither the accumulation of material beyond legitimate needs nor the shrinkage which delays the starting of an order until the receipt of the few pieces lacking to fill the requirements, or the division of an order into two lots rather than wait for a supply—for these and other expense saving purposes the system in use at the R. D. Nuttall Co.'s plant is well worth consideration by the progressive and economical shop manager.

The R. D. Nuttall Co. uses adjustable index tags on the edges of the leaves in the classified record, Figs. 1 and 2, and while these are a very convenient means of locating the desired pages and will work nicely with some degree of care, yet the writer has noted the tendency of the paper to tear on each side of the tag as the sheets are handled. If it is not feasible to make the tags conform to the flexibility of the paper by having the two sides more pliable as they reach the edge, then the writer prefers a numbered page and a card index covering the firms. This index, of course, could be extended to the work, class and dimensions of gears, etc., if it should be deemed advisable to increase the scope of the indexing. This suggestion is not an argument against the use of index tags and is made in the hope that these conveniences may be further improved and their field widened beyond the card index service to which they are well adapted.

And Pinions &c SHIPMENTS. No. 12

DESCRIPTION. Quot.	Pitch	Face	Bore	FOR WHOM.	SHIPMENTS. 1901							Completed	REMARKS.
24	4	1¾	9/8	Iron Trade Review Co	16 11-21							✓	Bp 2141 K
Racks 16	4	1¾			16 11-21							✓	
48	4	1¾	1⅞		16 11-21							✓	
Metric 106	2	8	6⅞	Illinois Steel Co	1 11-30	1 12-14	1 12-28	1 1-16 1902				✓	Bp 2864 A
Metric 48	2	8	4½		4 11-27							✓	" " B
Worm Wheel 24	4	2¾	2½	Bullock Electric Co	2 11-24							✓	
			S R H										
Worm 4	4¾	013	5/8 long S R H		2 11-24							✓	

FIG. 2.—CLASSIFIED ORDER, MATERIAL AND SHIPPING BOOK.

The Handling of an Order Illustrated.

In order to follow the R. D. Nuttall Co.'s system in detail as outlined by the engravings we may trace the progress of an order from its reception at the office to the shipment of the goods. Let us assume that an order has been sent to the R. D. Nuttall Co. for some gears to be made to a blue print. This blue print is distinguished in the orders by the initials, the number and symbol, in the usual way followed with shop drawings, and these particulars appear, as will be seen in the classified record. On receipt of the order, which we will assume is numbered 86440, the entry clerk fills out the necessary forms in every case, one shipping order and one office copy, at the same time making such shop orders as the nature of the work requires.

The writer has selected four of these forms as representative of the methods. They are illustrated in Figs. 3, 4, 5, and 6, showing respectively the office copy of gear order, the pattern order form, the machine shop order and time record, the shipping department form and cost record. The difference in the lettering will be a ready guide in following the entries upon the blanks. These are of uniform size, the original copy being about 7x9 inches in every case, the entry clerk uses a book typewriter, and with carbon paper the several sheets are made out simultaneously to the extent of the purchaser's order number, the R. D. Nuttall Co.'s order number, the date, name and address of customer, shipping directions, number and dimensions of goods ordered, together with other descriptive matter or instructions. Although the forms are quite similar in many respects there are some differences in the arrangement of each kind that will be apparent upon inspection. It will be seen, however, that references of an identical character are immediately under each other when the blanks are placed in the typewriter, and so far any one form is a record and, therefore, a check upon every other pertaining to that particular order. There is another safety device about the arrangement that should not be overlooked and this arose from the liability to lose an order in the shop—not any too rare an occurrence—and the possibility of a claim that the missing order had never been received. The various departments are designated by a number and this is placed upon the forms when they are first filled out by the entry clerk, and any one of them will then show how many have been sent to the shop and the particular departments. These figures are placed in the center of the form, immediately below the title of the order or, as in the case of Fig. 3, beneath the name of the company; the relative position of the figures being, of course, the same for each blank. A figure 2 indicates that an order has been sent to the pattern department, and 3 an order to the special work department of the machine shop, these orders being shown in Figs. 4 and 5.

The blanks having been typewritten are distributed to the appropriate departments after an examination in the first place of the classified record to ascertain the number on hand and necessarily the quantity to be ordered. In the present instance the order is for special work, and this decides the pattern shop order seen in Fig. 4. This is sent to the foreman there, who obtains the pattern and prepares a card for the shop record. These cards are uniform, so far as the size goes, but are of different colors to agree to some extent with the material ordered. This is followed on conventional lines, but the idea is good and its saves the time of the foreman, who can be better employed. It is also an addition to the record, that is capable of being made with no extra effort. The colors of the cards are varied sufficiently to indicate

cast iron, malleable iron, cast steel, and bronze; white and yellow, for example, being adopted for cast iron and bronze respectively. The cards are 3x4½ inches, this being the full size of the copy used in engraving Fig. 7, which shows one of these cards after being filled out to check the pattern at the stages traveled from shop to foundry and return.

Compare the Figs. 4 and 7, the former being the pattern

OFFICE COPY.

R. D. Nuttall Company.

Date 10-30-01

2 3

Bill No. ..... Customer Iron Trade Review Co.,

R.D.N. Co's No. 24641 Address Cleveland, O.

Pur. Order No. 86440 Ship to Same

Shipped by ..... Town ..... State .....

Date Shipped ..... Street ..... Via Xpress

Number Ordered	DESCRIPTION OF ARTICLES	Shipments	Bill	Date
	Per their B.P. 241 K.			
16	Bronze Gears 24 T. 6 P. 1¾"F. ⅝"B.	16 11 21 01	16 21	11/21

FIG. 3.—THE OFFICE COPY OF GEAR ORDER.

shop order made out in the office, the latter the record card prepared by the foreman of pattern room. The foreman locates the pattern and endorses the order as shown to the right of Fig. 7. He then notes the name of customer, the pattern number and the number of core boxes, on the card and returns it to the office, at the same time sending the pattern to the shipping clerk. The order clerk in the office

the selection of a foundry, nor does the shipping clerk have to spend time hunting for the unfamiliar parts of what may be special work (as in this instance) or, what is even worse than the spending of time verifying orders sent carelessly, making mistakes by the shipment of patterns liable to prove useless by the lack of some important part.

The record card should not be confused with the card

SHOP ORDER. **R. D. Nuttall Co.**

PATTERN SHOP

Date 10-30-01

2 3

Customer Iron Trade Review Co.,

R.D.N. Co's No. 24641 Address Cleveland, O.

Pur. Order No. 86440 Same

Xpress

Number Ordered	DESCRIPTION OF ARTICLES
	Per their B.P. 241 K.
16	Bronze Gears 24 T. 6 P. 1¾" F. ⅝ B.

Pattern 26442 In shop. Card made Beck, Foreman 10/31

FIG. 4.—PATTERN ORDER.

notes on the card where the pattern is to be sent and the card is then turned over to the shipping department and used as a shipping order for the pattern. When the pattern has been sent to the foundry the card is returned to the pattern shop and filed until the pattern is returned to the company and then, on receipt of the pattern, the foreman transfers the card to a file which shows only the patterns which are in the

index system frequently found in the pattern shops of many firms and which is intended to outline the construction, material and subsequent changes which a pattern may undergo. The card now under consideration is not intended to cover this ground, but is confined to the work of providing a receipt and record of pattern location, a purpose which it fills admirably. The ordinary pattern shop index system, as well

as the time cards of pattern makers and machinists have been eliminated from the present article in order that the other features of a comprehensive and yet simple system might be the more clearly described.

In the Foundry.

The pattern arrives at the foundry in due course, and in response to the requisition of Oct. 30, eight castings were delivered, weighing 49 pounds. On Nov. 5 four castings were received, weighing 25 pounds, and on Nov. 7 the remainder of the order came to hand. A reference to Fig 1 will show the itemized record of these dealings with the foundry from the original requisition to the delivery of the 16 castings. With the receipt of the last lot from the foundry on Nov. 7 the entry clerk checks off the molder's obligations by a "tick" in the column under the heading "Completed." There is an additional column under the general heading which may be used for any comments on the supply of material; *i. e.*, imperfect or dilatory work could be criticized, etc.

When the shop order was sent in to the foreman of the department selected for the machine work he secured the blue print as soon as it was to be obtained from the pattern maker and had the tools prepared and in readiness for use on the appearance of the castings. The workmen are then assigned the tasks they are to perform and on the completion of the job the foreman takes the time cards and makes the entries on the right-hand side of Fig. 5 and delivers the work to the shipping department.

SHOP ORDER. R. D. Nuttall Co.
TOOL ROOM

Date 10-30-01 2 3 Customer Iron Trade Review Co.,
R.D.N. Co's No. 24641 Address Cleveland, O.
Pur. Order No. 86440 Same
Xpress

Number Ordered	DESCRIPTION OF ARTICLES	
	Per their B.P. 241 K.	Completed 11/21
		Martin 30 hours turning
		Jones 29 " boring
		Radcliff 19 " cutting
16	Bronze Gears 24 T. 6 P. 1¾ F. ⅜ B.	Laborer 2½ "
		J.B.K. Foreman

FIG. 5.—MACHINE SHOP FORM AND TIME RECORD.

Shipping Department System.

The shipping department checks the number to be shipped and if the order is complete, ships the finished product and notes on the shipping order form the number sent, the date and the shipper. If, however, the order was incomplete for any reason and only a portion could be shipped, then the number of pieces sent forward would be inserted in the column "Number Shipped" and later a duplicate of the original order, showing the number due, would be returned from

SHIPPING ORDER. R.D. Nuttall Co. 1 2 3 4 5 6 7 8 9 10 11 12

Date 10-30-01 Bill No. A 1621 2 3 Customer Iron Trade Review Co.,
R.D.N. Co's No. 24641 Address Cleveland, O.
Pur. Order No. 86440 Ship to Same
Shipped by RM 11 Town State
Date Shipped 11/21-01 Street Via Xpress

Number Shipped	Number Ordered	DESCRIPTION OF ARTICLES	PLEASE NOTE—(Space under this heading for price extensions only)				
		Per their B.P. 241 K.					
16	16	Bronze Gears 24 T. 6 P. 1¾ F. ⅜ B.	3	20		51	20
		Material 18.40					
		Labor 21.60					
		40.00					

FIG. 6.—SHIPPING DEPARTMENT FORM AND COST RECORD.

office to the shipping department and the company would bill again from A 1621 when the balance went forward. The right-hand columns on the shipping order have been filled out to illustrate the manner in which the form is subsequently employed in the office, together with some notations to show how the cost of an order is given on the face of the form. This is not done, however, until its return to the office, the insertion of the bill number (in this case A 1621), etc., when the shipping order becomes a charge sheet.

The small figures in the upper right-hand corner of the shipping order are used to indicate the number of cards or orders sent back to the shipping department after partial shipments. For example, the original shipping order is No. 1. Then if partial shipment be made the balance is drawn off on to a new shipping order and the second order, or the "Return Card," as it is termed in the office, is then No. 2, and the numbers are checked by a "tick" applied to the appropriate figure in the series given at the upper corner of Fig. 6.

The classified record, Figs. 1 and 2, may contain suitable references in the available columns to changes in the original blue prints or additional instructions, as to whether a gear shall have keyway or set-screws or a combination of these, together with the sizes, etc. These variations are, of course,

R.D.NUTTALL CO.

PATTERN SHOP RECORD

Pattern No. 2642 Coreboxes 1

Iron Trade Review Co

Sent to Phoenix Bronze Co.

City

Shipped by F.S. 10-30 190

Returned, date 11-8

Patternmaker's receipt J.B.

FIG. 7.—RECORD CARD FOR PATTERNS AND COREBOXES.

entered upon the shop orders immediately on receipt of customer's requisition and copied into the classified record which thus keeps in plain sight the variable factors of the product. The "No. 16" in the upper left-hand corner of Fig 1 and the upper right-hand corner of Fig. 2 is usually employed to indicate the maximum number of parts to be kept on hand. In the case of a special order, as the one from the Iron Trade Review Co. for 16 gears, there is no necessity to keep any supply beyond the number absolutely required to meet the customer's demands, and any excess would be useless. The last item on the classified record book is entirely of another character and we may assume that there is sufficient demand for worms of this size to warrant the maintenance of a specified quantity in stock. The entry clerk can follow the fluctuations in the supply on hand and at any time make a requisition upon the manufacturing departments for a further installment, limiting the number, however, according to that shown at the heading of the page.

The system is very simple and by no means so involved as the length of this description might suggest. In fact the practiced accountant will grasp the leading features readily from an inspection of the engravings. The writer has had in view, however, the many shop managers who would prefer a treatment of the subject from their own standpoint. It should not be inferred that the system requires any addition to the average clerical force in the office; on the contrary, the work is so subdivided through the departments that the company actually seems to have fewer clerks than the complexity of the work would appear to need—a condition only possible by that specialization of employment that marks modern manufacture and which is just as applicable to the office as to the shop.

The whole scheme is broad enough to cover the regular lines of stock manufacturing of "ready made" gearing and at the same time handle a specialized or jobbing business; and this facility with which it may be adjusted automatically to the varied requirements of the R. D. Nuttall Co. suggests the extent to which it may be useful elsewhere. The writer takes this opportunity to acknowledge his indebtedness to the R. D. Nuttall Co. for an opportunity to examine their methods, and for permission to describe them. R. I. C.

A SIMPLE COST CARD.

We show below the general cost card used in the Watson-Stillman shop, New York. The first line is filled in with the name of the appliance. The cast iron, steel castings, or other material are noted by weight and cost and the expense for pat-

Date.					
		C. I.	lbs. @	c	Patterns $
		S. C.	" "		Drawings $
		Brass	" "		Mach. Work $
		Forgings	" "		Other Work $
		Total Cost $			
		Cost without Patterns and Drawings $			

terns, machine work, etc., given. The other details will be easily understood and the simple form of this card and its general usefulness appreciated by shop men. The dimensions of the card are 5 x 3 inches.

Production of Pig Iron in Canada in 1901.

The production of pig iron in the Dominion of Canada, as ascertained from the manufacturers by the American Iron and Steel Association, amounted in the calendar year 1901 to 244,976 gross tons, as compared with 86,090 tons in 1900, 94,077 tons in 1899, 68,755 tons in 1898, 53,796 tons in 1897, 60,030 tons in 1896, 37,829 tons in 1895, and 44,791 tons in 1894. The statistics of the Association do not go back prior to 1894. Of the production last year 228,893 tons were made with coke and 16,083 tons with charcoal. The production of Bessemer pig iron, included above, amounted to 29,577 tons. Neither spiegel nor ferro-manganese was made. On Dec. 31, 1901, the unsold stocks of pig iron in Canada amounted to 59,472 gross tons, as compared with 12,465 tons at the close of 1900 and 9,932 tons at the close of 1899. Of the unsold iron on hand on December 31, 1901, 54,563 tons were coke pig iron and 4,909 tons were charcoal pig iron.

On Dec. 31, 1901, there were 14 completed furnaces in Canada and 4 furnaces were in course of construction. Of the completed furnaces 7 were in blast and 7 were idle on the date named. During 1901 four furnaces were erected by the Dominion Iron & Steel Co., at Sydney, Cape Breton, Nova Scotia, three of which were blown in in 1901. The fourth furnace was put in blast in January, 1901. Of the 14 completed furnaces 9 were equipped to use coke for fuel, 4 charcoal, and 1 charcoal and coke.

Railroad Situation at the Root of Steel Imports.

General Manager Swank says in the current issue of the Bulletin of the American Iron and Steel Association:

"We have really commenced the importation of pig iron and steel billets in small lots to meet the urgent needs of some manufacturers. For this unexpected change the railroads are wholly responsible. If they could have delivered raw materials to the furnaces with reasonable promptness there would have been no shortage in the supply of either pig iron or billets. This anomalous condition can not last long, as this country has today the capacity for producing all the iron and steel of every description that it can possibly need this year or next year."

W. W. Root, well known in Cincinnati railroad circles, and formerly general western freight agent of the Big Four at Kansas City, has become connected with the S. Obermayer Co., manufacturers of facings, etc. Mr. Root is in charge of traffic for the company and will look after the traffic of its plants at Chicago and Pittsburg, as well as at Cincinnati.

Comparative Use of American and English Tool Steels in the Machine Shops of the United States.

The Iron Trade Review recently published an article, taken from London *Engineering*, giving the experiences of an English mechanic in American machine shops. Some of the assertions made were editorially discussed in the same issue, and we later received a letter from the Kelley Axe Co., Anderson, Ind., commenting upon the opinion of the English critic so far as it referred to the use of foreign steel in the American shop. In order to get an expression of opinion on the relative use of British and American steels a quotation from the article was sent to a number of firms, inquiring how far the finding of the writer agreed with their experience with tool steels in the machine shop. The quotation was as follows: "English steel makers seem to have a monopoly of the American tool steel market. The Americans themselves admit that their steel is not so durable."

Some of the replies were sent in, with the request that the name of the firm be omitted, if reference should be made to the letter. The possibility of an increased correspondence was one among the objections raised to publicity. The absence of the name in these cases lessens the weight of the opinion, and we regret the omissions, owing to the prominence of some of these correspondents. The users of tool steel undoubtedly have very good reasons when one make of steel is substituted for another, and the machine builder and steel manufacturer would be benefited by having a consensus of opinion from the machine tool trade on the relative merits of English and American tool steel.

The four unsigned communications are from large Eastern firms and following them is a selection from the answers we have received. We take this opportunity again to tender our thanks to the writers for the highly interesting and useful symposium we are able to present on this important question.

American Tool Steel Entirely Satisfactory.

A New England manufacturer of machine tools writes:

In our own shop, for quite a number of years, we have been using tool steel of American manufacture and find it entirely satisfactory. We might say, however, that in addition to this grade of steel we are using Mushet's self-hardening for cast iron work, as it seems to be a little more satisfactory on this grade of material. The claim made by the English writer we think is too broad to be well founded, for if English steel makers have obtained nearly a monopoly of our market, it would seem to follow that American tool steel manufacturers must cut a very small figure. In opposition to this claim, note the organization of the Crucible Steel Co. of America, also the new Colonial Steel Co., works for which are now being built a short distance from Pittsburg for the manufacture principally of high grade tool steel.

English Steel Good to Stand Abuse.

An Eastern manufacturer of small tools gives the result of his experience as follows:

It seems to us that this English writer has not taken the trouble to inform himself very much as to the condition of the American tool steel market; for if he had he would not have said that the English steel makers had a monopoly of the tool steel business in this country. There are a few companies that use quite a lot of imported steel, but they are not very thick and we are not of the opinion that they are increasing. We use some 150 to 200 tons of high grade steel a year and we do not use any imported at all. We know that Jessop's steel is steel that will stand lots of abuse and, perhaps, if it is handled by inexperienced people, it might give better satisfaction than American steel of the same quality, but, when it comes to a test to see which steel will do the most business, we should take some of the best American makes. We use quantities of cutters here in our factory, and we have always found that high grade American steel gives the best satisfaction and we do consider American steel superior to English, provided it is handled by people of experience.

Both American and English Steels in Use.

The following is from a large Eastern concern manufacturing heavy tools:

We do not care to put ourselves in print upon the subject of tool steel. We use both American and English steels, as we find them best suited to our purpose.

Some Foreign Air-Hardening Steel.

An Eastern Pennsylvania tool works gives the following to be used without name:

Most of the tool steel that we use is American; we have used some foreign air-hardening steel and are now trying a new English air-hardening steel which has given us very good results. We, however, understand from other firms who are using this and other American air-hardening steel that they obtain more satisfactory results from the American steel.

No English Steel in the Westinghouse Works.

H. L. Barton, assistant superintendent of the Westinghouse Machine Co., East Pittsburg, Pa., says:

I can only say that we use no English steel whatever, and have used none since my connection with the company. There were several Mushet steel tools in the shop when I came here, and as long as six or seven years ago we had no difficulty in getting American steel to do as good work as these Mushet tools did.

In the last three years the quality of tool steel has been materially improved, but until the last two or three weeks I never have had any English steel with which to compare it. We have now two or three sample tools, of a special and very high priced English steel, which is unquestionably a splendid article, but the Crescent self-hardening steel, which is a high grade of tool steel we are mostly using now, is just as durable and just as satisfactory under any conditions of speed or cut that is regularly used. Two or three sample tools are, however, no basis upon which to form an opinion as to comparative merit of the English and American steel. We have been so perfectly satisfied with the Crescent self-hardening steel that we have not been looking very hard for a substitute, though we have used samples of other American self-hardening steel whenever they were submitted to us.

As a matter of fact the present conditions are such that the tool steel will stand more hard work than our machines are capable of giving it. The above indicates nothing except that the English steel makers certainly have no monopoly of our business.

American Tool Steel Equal to the Best.

The Acme Machinery Co., of Cleveland, manufacturer of bolt, nut and special machinery, writes:

We are reminded of the old adage that "comparisons are odious" and therefore hesitate somewhat about expressing our opinion. Perhaps it would be just to say that as we understand it American tool steel makers understand the chemistry and manipulation of the material of tool steel as well as any body, and if there are any steels made in England that are any better than the American, they are due entirely to the fact that the English maker controls some ores that are not available for other makers of steel. It has been intimated to us that this is the case; we do not know it to be so.

Our own experience is that the American steel makers make just as good steel as is made anywhere on earth, no matter what the quality desired may be, and in our own practice we find these American steels satisfactory in every way, both as

we use them in the processes of our own manufacture and as we send them out as a part of those manufactures.

One Foreign Brand in Favor.

Gould & Eberhardt, of Newark, N. J., builders of machine tools, write:

For some time over a year we have been using domestic self-hardening steel entirely. Previous to that we used foreign made steel, for the reason that it seemed to be better than what we had had experience with here; then the American came forward, and we dropped the foreign-made. We are about in a period of another change, in which we think that a certain foreign steel has marked advantages.

American Steel Increasingly Used.

The Detrick & Harvey Machine Co., of Baltimore, Md., manufacturer of planers, bolt-threading and nut-tapping machines, etc., comments as follows:

We use both English and American tool steels, though our tendency of late has been to use more and more American tool steel. We use of the English steels Jessop's, and Seebohm & Diechstahl's. Of the latter we only use one brand, which is their "Capital," and is a remarkable steel from the fact that while it can be filed, it will stand a cut of from 60 to 80 feet per minute.

Of the American steels, we use Firth-Sterling and the steels made by the Crucible Steel Co. of America. Of the latter, we are using the special air hardening rapid cutting steel with which we obtain the same results practically as from the "Capital" steel mentioned above. On the whole, we should say that we obtain quite as good results from the American made article as from the English.

A Larger Percentage of American Steel.

The Fellows Gear Shaper Co., of Springfield, Vt., says:

With reference to the comparative value of English and American tool steel we would say that as we use but a comparatively small amount of tool steel, we do not feel ourselves competent to pass judgment. At present we are using an English steel with very good results, although we have not used this in as large quantities as steel of American manufacture. As we have only just recently commenced using the English steel, we have not had time to test it thoroughly under all conditions.

English Steels Preferred Until Recently.

The American Tool Works Co., of Cincinnati, manufacturer of machine tools, writes:

In our experience up to within the past year, we have found no tool steels that would equal the English make of steel. However, since that time we have made some very exhaustive tests of American makes, and while as yet we do not think that the latter have surpassed the English makes, we do think that they have approached them. In one of our tests we have obtained excellent results from the use of a special make of the Sanderson Co., and we hope that in the near future we will be able to talk more intelligently on other American makes.

American Steels Supersede British.

The New Haven Mfg. Co., New Haven, Conn., manufacturer of machine tools, says:

We formerly used English tool steel but now we use American makes and are satisfied. Anything that is "made in America" is good enough for us, and we consider equal to anything to be had elsewhere.

Best American Self-Hardening Steel Equal to Mushet's.

Prof. John E. Sweet, President of the Straight Line Engine Co., Syracuse, N. Y., says:

It is quite likely there is a good deal of English steel sold in this country, as it is true that there is an enormous quantity of tool steel made here. For many years after the American tool steel was extensively used, Mushet self-hardening steel was brought in large quantities but now the best self-hardening steel of American make is equal to the Mushet. Special steel for springs from Germany and steel from Sheffield for pocket cutlery is no doubt used, and the users are quite justified in its use, whether just as good is made in this country or not.

When a man is making something where there is a lot of work on a little material and he has learned what he can do with certain steel, it would be the height of foolishness for him to change either to save first cost or for sentiment. Of course the man who made the statement you quote, likely believed he was telling the truth, and was, so far as he knew, but he simply did not know what he was talking about or else I don't. Perhaps some of your readers have the figures.

Jessop's Steel not Superior to American.

The Bausch Machine Tool Co., of Springfield, Mass., manufacturer of radial drills, boring mills, etc., says:

We have your favor and note what you say in reference to the use of English steel in America. Would say that we have not used very much of this, outside of the Jessop steel. We have used quite a little Jessop steel from time to time and find it a very good quality, but we cannot see that it is really any better than the American steel that we have used. We have a shipment now on the way from Paris, a French steel, which is being sent us on trial. We will report to you later in reference to this stock.

American Steels Deficient.

The Garvin Machine Co., of New York, manufacturer of machine tools, writes:

We have used three or four of the American tool steels, of the best makes and have found them all sadly deficient, mostly as regards uniformity of the steel. One piece would be entirely satisfactory, and as good as the English steel and the next lot would be all bad, and our tools would all fly, and cost us lots of money. So we have settled on the Jessop's tool steel, and have excellent success with it. It would take considerable persuasion to induce us to use any other steel in our fine work.

American Self-Hardening Steel Preferred.

The Draper Machine Tool Co., Worcester, Mass., manufacturer of machine tools, says:

We use both kinds, American and English steels, but more of American tool steel than of English. We find today most of the tool steel made in this country is equal to and in some cases better than any English steel we have ever used. We formerly used English self-hardening steels, but today we are using nothing but American brands for the reason that we consider them better.

Mushet Steel Has a Place — A French Steel for Which Much is Claimed.

The Bignall & Keeler Mfg. Co., Edwardsville, Ill., manufacturer of pipe-threading and cutting machines:

Replying to your inquiry regarding use of English tool steel in American shops, will state that we think the paragraph quoted misleading. There is a large amount of Mushet steel still used in this country, as this steel, as you probably know, has self-hardening properties, *i. e.*, it is not necessary to temper before using. We have found this very serviceable in finishing a hard casting or hard metal of any kind and also for taking long cuts where the lasting quality of the steel is to be considered.

There is also some steel, just what amount we do not know, of foreign make that is used for special taps and dies, but we believe that this same quality of steel can now be purchased in this country. The Sanderson plant at Syracuse, belonging to the Crucible Steel Co. of America, now makes a self-hardening steel which we have found to be equal to and perhaps better than the Mushet steel. We recently purchased some steel from a French mill, whose representatives visited this country last summer. They made a special claim for this steel and we thought we would try it for some of our master taps and dies. We have used some of it, but in so far as we can tell at this time, it is no better than steel which can be purchased in the American market. It is a high priced steel and if you pay the same amount for American steel, we believe you can get just as good a quality. The representative who sold this steel stated that they were making a special effort to introduce this steel in the United States at this time, as they felt sure that within a few years the American mills would be making a grade equally good, if not better, and they wished to take advantage of the few years remaining to them to make all they could. We believe that within a few years the American

mills will be turning out steel exactly as good as any of the foreign mills, and the foreign mills excel only in some of the higher grades of tool steel.

American Steel Equal to British if not Superior.

From the Billings & Spencer Co., Hartford, Conn, manufacturer of machine tools and drop forgings:

We are using almost exclusively American tool steel in all of our departments for tools of all descriptions, and we consider that the American tool steel is equal, if not superior, to the English material. We use a quantity of English tool steel, but usually because it is specified by our customers. Ten or fifteen years ago we considered that it was not possible to get as satisfactory steels for tools in America as was furnished by the English makers, but we consider that today the American steels are fully equal, if not superior, to the English.

A Varied Experience with Foreign Steels.

The Pratt & Whitney Co., Hartford, Conn., manufacturer of machine tools, writes:

We would say that the statement by the London *Engineering* correspondent is not borne out by our experience. We use far more American steel than we do English or European. During the last year we have tested a number of the so-called high grade European steels, embracing the English, Swedish, Russian, French and Styrian. Among them we found some excellent steel. For a high grade hardening tool, we find nothing better than the best Styrian. For all around work there are few better hardening tools than the English Jessop; but the American steels, except in peculiar situations, are equal to any. We have not found a self-hardening steel that will compare to American manufacture and have supplanted the Mushet, which was the great reliance for heavy hard work for so many years, for steels made in the United States.

The machine shop should be the most critical place to use steel. The cost per pound may not signify when the durability of the tool and the work it will accomplish in a given time are considered. If a tool is durable and requires few dressings, the waste of the steel is slight; if the tool will do more work in a given time with the same amount of dressing, a greater return is had by the economy effected; but, if the tool will do more work and last longer, we have the desideratum that is so important in machine shop records, and we think the American steel manufacturer has reached this point preëminently.

No English Steel in Baldwin Locomotive Works.

Burnham, Williams & Co., proprietors of the Baldwin Locomotive Works, Philadelphia, write:

We do not use any English steel. We obtain very satisfactory results from American self-hardening steel.

Ninety-five Percent Pittsburg Steel.

Edwin E. Bartlett, of Boston, manufacturer of the Greenerd arbor and other tools, writes:

We notice that it is one man's opinion that the English steel makers seem to have nearly a monopoly of the American tool steel market. I believe that this would have gone unrefuted eight years ago or possibly five years, and it is somewhat difficult even now to convince old men that American steel is superior, but it is the writer's opinion that American tool steel is gradually superseding the imported article. We are using no English steel, and a small amount of Austrian steel, but certainly ninety-five per cent of the tool steel that we use is made in Pittsburg.

Since receiving your letter we have spoken to several of our friends about this and they all agree with the opinion above expressed. The writer was surprised during a visit to England some three years ago to learn that the English steel that stood the highest in this country was considered there to be a very ordinary steel. We think the marketing of steel like everything else is a matter of commercialism. The best salesman will get and retain his customers even in spite of poor steel.

American Steel Better in Many Cases and Costs Less.

Loring Coes & Co., Inc., of Worcester, Mass., manufacturer of machine knives, writes as follows:

We would say that we use some 15 or more brands of steel bought from a dozen or more makers. We use but two brands of steel that are made outside of the United States and we use these only when specified or when our judgment indicates that they are needed in the work. We fail to see that there is any difference of any kind in the quality of these steels and those made in America.

We also note as a fact that over three-fourths of the concerns that advertise to use English steel, do not do it but use American steel and put the difference of cost in their pockets. This is especially true in our line. The English tool steels on the market are general purpose steels and are made with what is known as "general purpose temper." In our opinion it is impossible to use one steel and one temper (percentage of carbon) for all purposes. For this reason we select the carbon and grade best suited for the work in hand, irrespective of its cost and making the cost a secondary feature and contingent only on the amount of labor the steel is expected to do. It is possible to use ordinary grade of American tool steel in places where the English steels will not stand for a moment, and the American product costs about 40 per cent less than the English product. It is easy to see from the amount of business done by the Crucible Steel Co. of America, and the amount of steel imported from England, that the actual fact is that the American steel practically monopolizes the market, English steel being less than 20 per cent of the total Crucible steel product used in the United States. We think your informant very poorly in touch with American industries; also that the Americans who have stated that our steel is not as durable must be those not acquainted with its working or who are unable through lack of experience to obtain the best results. No one in his right mind would make such a statement for publication and it is doubtful if your correspondent can produce the evidence which he cites.

Both Domestic and Imported Steel Satisfactory.

The Leland & Faulconer Mfg. Co., of Detroit, manufacturer of machine tools, says:

Our general superintendent advises us that we are not in position to give a critical explanation of the comparative merits of the two steels. In our practice we have been fortunate in securing entirely satisfactory results from both the American and the English steels, and believe that the best quality of steel made in either country is very satisfactory for the purpose for which it is intended when properly treated.

American Steel Replacing English in the Sellers Shops.

Wm. Sellers & Co., Inc., of Philadelphia, write as follows:

Nearly all the tool steel in use in our shops was purchased of American makers. We still have some English steels, but as they are consumed they are replaced with American products, and from our experience with American steel this practice will be continued.

English Steel More Even in Quality.

The Brown & Sharpe Mfg. Co., Providence, R. I., manufacturer of machinery and tools, says:

Doubtless the opinion that you quote from London *Engineering* is a common one among English steel makers; but you, as well as we, know that the statement made therein about their having a "monopoly of the American tool steel market" is not strictly true. American steel has been improving for years past, and it may improve in the future. It has not, in our opinion, come up to the quality and evenness of the English steel. For this reason we have continued the use of English steel in the making of cutters and similar tools, knowing that it gave us the greatest assurance of desired qualities. In our experience it is a steel superior to any American steel, taken the year through, and we should be loath to change, all things considered.

American Tool Steel Fast Approaching English.

The following is from the Hamilton Machine Tool Co., Hamilton, O., manufacturer of machine tools:

We think that the quotation which you make has been more nearly true in the past than it is in the present, as we find that the best brands of American tool steel, both tempered and self-hardening, are fast approaching the excellence of the best English brands. During the past few years, we should say that for tool room purposes and for turning tools, we have used probably from 50 to 75 per cent of our purchases

of the English steel makers. We do not think, though, that this proportion will hold good this year.

We hardly care at this time, to enter into the relative merits and demerits of the two makes, but our purchases as indicated above would show how this matter has been practically treated in the past. We expect, however, that the American manufacturers will soon excel in this as they do in most everything else they undertake.

Introduced High Grade American Drill Steel.

J. D. Cox, of the Cleveland Twist Drill Co., Cleveland, writes as follows:

We beg to say that our experience in the use of American steels is directly contrary to that quoted by you from an English writer. The writer of this letter commenced manufacturing drills in 1876. We believed that we could make a success of this business by using exclusively American steel and we have stuck to that policy ever since. We have repeatedly made competitive tests with drills made from various brands of English steel as compared with the same sizes made from American steel and we have always found that the American steel was, to say the least, as good as the best that could be bought in England. We were the direct means of the introduction in America of the manufacturing of high grade drill rod wire. Mainly through our efforts this manufacture was commenced by one of the Pittsburg steel works as early as 1878. Through our united efforts this product was brought up to a very high state of efficiency and we have never been able to buy foreign drill rods that were in our opinion as good in all respects as that made in this country, and we know for a fact that several makers of tool steel in America are now selling in large quantities their tool steels in England in direct competition with the best English makes.

I believe that the American steels are better finished by the mills and that the various grades run more uniform than do those of English makes. Of course this is only the opinion of one concern but we feel that we are in some measure capable of forming a correct judgment on this subject.

Less Than Two Per Cent Foreign Steel.

The Lodge & Shipley Machine Tool Co., of Cincinnati, manufacturer of engine lathes, says:

The statement made by the English writer may have been true a few years ago, but we do not believe it is today. We are not using two per cent of foreign tool steels in our shop.

Use Only American Steel.

The Becker-Brainard Milling Machine Co., Hyde Park, Mass., writes:

We use wholly American tool steel in our works as we have always found same to be equal in every respect to the English steel. Some years back it was the experience of most manufacturers that American steel did not run as uniform as English steel, but we think this has been largely overcome and we are experiencing no difficulty in this respect at the present time.

Practically All American Steel.

From the Landis Tool Co., Waynesboro, Pa.:

We are using very little, if any, English tool steel. We for a considerable time did use Jessop's steel but have for several years been using that made by Pittsburg manufacturers.

English Self-Hardening Steel More Uniform.

E. A. Muller, superintendent of the Springfield Machine Tool Co., Springfield, O., says:

We use both American and English steel with good success. We must admit, however, that the English steel is a little more uniform in quality than the American, especially is this the case with self-hardening steel. In other respects we do not find much difference.

Domestic Steel Fully Equals the English.

The Beaman & Smith Co., Providence, R. I., manufacturer of machine tools, says:

Would say that we have not knowingly, for several years past, purchased tool steel of English make. We find that made in this country, for all purposes for which we buy it, is fully equal to any English steel we have ever purchased.

English Steel on Larger Work.

Flather & Co., Nashua, N. H., manufacturer of machine tools, says:

We use both American and English steels. We use Jessop's tool steel for all our large cutters and taps, say, anything over 1¾ inches round, for the reason that we have better results in hardening their steel. Perhaps the reason may be that our men understand how to harden the Jessop's steel better, although we have no trouble with American tool steel on small work.

Use No English Steel.

The J. M. Carpenter Tap & Die Co., Pawtucket, R. I., writes:

The best information we can give you on this subject is to say that for quite a number of years we have used absolutely no English steel whatever in our factory.

The Home Product Meets All Demands.

The Universal Machine Co., Providence, R. I., manufacturer of Universal grinding and special machinery, says:

We have used almost exclusively American-made steel, the only instance in which we have used English steel is when the local dealers do not have the required size of American steel in stock. We have found home product to be equal to any demands made on it in our shop and consequently have had no desire to experiment with the English steel.

Very Little Imported Steel.

The Farrel Foundry & Machine Co., Ansonia, Conn., writes:

Would say that as far as our machine shop is concerned, we are using for our severest work American tool steel entirely; in fact, we have for several years used very little imported tool steel.

Depends on the Service Required.

The Potter & Johnston Machine Co., Pawtucket, R. I., manufacturer of machine tools, says:

We use Jessop's tool steel and Sanderson self-hardening steel for our planing and turning tools, and Howe-Brown American steel for all of our cutters. After many tests we have concluded that the above give the best results for their respective classes of work.

New Iron and Steel Works Directory.

Announcement is made by General Manager Swank that the 1902 edition of the Directory to the Iron and Steel Works of the United States, thoroughly revised to the close of 1901, will be ready this week. It is a volume of nearly 450 pages, or 50 pages more than any preceding Directory. The consolidations, with full descriptions of all their plants, are given in detail in the first part of the book. Following them is a classified list by States of all the other iron and steel works of the country, and in Part 3 a classification by States of all the iron and steel works in the United States except blast furnaces, according to their products. No complete Directory has been issued since 1898. Meantime the changes have been revolutionary; and scarcely less noteworthy is the large number of entirely new independent organizations and plants. The new Directory is sold at $10. It can be secured direct from the American Iron and Steel Association, or through the office of *The Iron Trade Review.*

The 1902 meeting of the Lake Superior Mining Institute will be held on the Vermillion and Mesabi ranges, beginning on Tuesday, Aug. 19. The last meeting on these ranges was in March, 1895, when the open pit mines were closed down. There has been great development in the intervening years and the members of the institute will this year see all the Minnesota mines in operation. Papers are to be distributed among the members in advance of the meeting. A. J. Yungbluth, Ishpeming, Mich., is secretary.

The Clayton Air Compressor Works, of 120 Liberty St., New York, referring to recently published statements carrying the inference that they had sold out and gone out of business, say that these were in no way authorized and were misleading. The Clayton Air Compressor Works have made no changes that will alter their business relations with their customers. With new capital they are enlarging their works and increasing their patterns and sizes.

MR. KEEP'S WORK ON "CAST IRON."

BY RICHARD MOLDENKE.

"Cast Iron" is the title of a book just brought out by Mr. W. J. Keep, who has long made the study of this interesting material his specialty. In his preface Mr. Keep throws down the gauntlet to those who differ from his views, and frankly states that he "advances decided opinions regarding the best methods for a founder to obtain the best results," and summarizes his shrinkage test method as an introduction to the book. Mr. Keep will naturally not be surprised if he hears some equally decided opinions in opposition to his claims, especially from those who have had a wider range of experience with all kinds of castings, but who value none the less highly his labors to benefit the foundry trade at large.

Naturally, in a book by Mr. Keep, the one-half inch square test bar permeates the whole of it, and lessens its value to the founder who chooses to follow the more modern tendency to deal with actual facts, as brought out by the more expensive, but vastly more useful, laboratory. Be this as it may, Mr. Keep has developed a method which he can use with a fair chance of success if he can regulate the dampness of the molding sand and the pouring temperature of the iron, heat after heat, to a nicety—and then only in his own line of work, the stove trade. This embodies the upper range of iron castings, so far as their silicon and phosphorus contents are concerned. The method is known to be of doubtful value for the medium ranges of silicon, and entirely inapplicable for the low ranges, for here the shrinkage (contraction were a better term) and strength will not be uniform when iron from the same ladle, poured at the same time, is used, not to speak of iron from different parts of the same heat. Indeed, Mr. Keep does not like test bars which run toward whiteness, holding that "very little satisfaction will result from tests of white test bars." And yet this cuts out perhaps one-third of the foundry tonnage of the country from the benefits claimed for his method, and leaves another third doubtful. The first third as a whole, and most of the other third, it may be added, are now taken care of by the laboratory, in spite of the fact that "chemical analysis will not account for all physical properties of cast iron," which is very true, as is also the fact that three-quarters of our foundry iron is now bought by analysis.

So much for Mr. Keep's shrinkage and strength test. It may safely be left to the future. Where it can be used it is only right and meet that it should be, and where it cannot be used it will not stand in the way of progress.

Chapter I is one of definitions. Concise and good ones are given for quite a variety of terms used in the realms of physics and mechanics, as applied to testing; and for materials used by the founder. Next come some remarks on the graphic method of presenting records, followed by a chapter devoted to Mr. Keep's method of experimenting.

After this the interesting part of the book begins. The crystallization of iron is explained at length. It is held that the idea that liquid iron is more dense than crystallized iron is mistaken, the fact that iron will float until melted, notwithstanding, as shown by Mr. Keep on page 63. To the ordinary observer it would seem that the specific gravity of the floating iron must be less than that of the liquid material, parallel being found in the floating of ice in water. Mr. Keep explains the matter by stating in substance that cold iron is heavier than melted iron and sinks, but as it is heated up expands, and becomes lighter than both cold and liquid irons. But iron at nearly the melting heat is still crystallized, and so it would seem that after all liquid iron is of a greater specific gravity than the same crystallized iron when heated. It may be, to turn the process around, in spite of Mr. Keep's denial of an instant of solidification, that iron does expand at the moment of set, as according to his own reasoning, it must be more expanded than either melted or cold iron. There is something not altogether convincing in Mr. Keep's "first correct explanation of this phenomenon," as a piece of cold iron dropped into a ladle of melted iron rises to the surface too quickly to be heated sufficiently for use in the argument referred to above, and moreover some pieces of cold iron thus treated do not usually "float with half the bulk above the surface until all melted," but barely rise above the surface.

Chapter V discusses carbon in cast iron. A few errors in the metallurgical part of the text must be noted. Cast iron, Mr. Keep holds, cannot absorb carbon in the cupola when being remelted. Since Mr. Keep calmly brushes aside the results of other experimenters on cast iron, his attention must be directed to the common practice of recarburizing a bath of steel by simply throwing on it powdered coke. This is greedily absorbed and yet the steel is not in the state of a sponge of iron, as he holds it must be for this purpose. In trickling down through the bed of incandescent coke in the cupola, the melted cast iron is temporarily just as hot as steel, and can dissolve some carbon from the coke, as experiment has proven over and over again, provided that the silicon contents is pretty low. High silicon irons are fairly well saturated as they come from the furnace, and do not show this occurrence so plainly, but it is there, nevertheless.

The chapter on silicon in iron is an excellent one and deserves careful study. From the time of Prof. Turner's reports, every investigator has been at work on this point, and a revolution of foundry practice is the result. Shrinkage(?) comes in for a series of remarks, together with Mr. Keep's cooling curves. The discoveries of the last few years in the metallography of steel would make it an interesting matter to repeat the experiments given, with more modern apparatus, in order to trace a possible correlation between steel and cast iron, based upon the different forms of carbon in each. The critical points found would be interesting.

Phosphorus, sulphur, and manganese give Mr. Keep a good opportunity to show the enormous work in the line of testing which has come under his observation, in order to obtain information on the effect of these elements on cast iron.

Segregation is well illustrated by a number of examples taken from Mr. Keep's practice. That his information, however, does not extend very deep into the chilling irons is shown by the paragraph on the subject on page 114. It will be news to our metallurgists, as well as roll and malleable founders, that chilling is caused by a "union of silicon and carbon" and to the latter, especially, "that the best chilling irons are not those with the lowest silicon." Is it not known now that with the same composition coke irons chill as well as charcoal?

The chapters which are devoted to the strength of cast iron are of much interest. Whatever difference of opinion may exist on the subject of round versus square test bars, and on bars cast vertically and cast flat, those who understand the subject will best be able to judge. Mr. Keep, however, seems not to have grasped the spirit of the engineer who makes tests with the materials he must use in his constructions. Whereas the deductions of the volume before us all point to the half-inch square test bar as giving the best results, best in the sense of high strength, and by inference justifying Mr. Keep's system, the engineer who has responsibilities to bear looks at the question in an altogether different light. He wants bars as near as possible to the sizes he has designed in order to make proper and safe deductions. He, therefore, rejects the higher results of the small square bar as artificial, and takes the large round one as less influenced by conditions of unequal cooling. He prefers the bar cast vertically, because the one cast flat gives different results when broken cope side up from cope side down. This matter is a grave one, it seems to the reviewer, in view of the enormous interests that will be at stake when cast iron becomes as much the subject of specification as steel is now. The committee of the American Foundrymen's Association, some of the results of whose work Mr. Keep has quoted, have had the needs of the engineer in mind when they reported the specifications since adopted by that Association. It is but just to Mr. Keep to state that his work was complete when the report in question was issued; otherwise he would have surely made some modifications, unless indeed his challenge covers even this.

Impact testing is next touched upon lightly, and Mr. Outerbridge's well-known discovery of the strengthening of test bars by tumbling commented upon. The attempt is next made to approximate the percentage of silicon, the shrinkage, and the strength of any other size of casting than the one tested. Anyone who reads the succeeding chapters on chemical versus mechanical analysis, will be puzzled. The severe arraignment which chemical methods of foundry control receive, and the unstinted praise meted out to the mechanical, that is to say,

Mr. Keep's method, make the whole matter appear as so much advertising. Indeed Chapter XX deals with Keep's test apparatus. In Chapter XVIII, however, Mr. Keep is frank enough to give his own method rather a black eye by showing a variation of 20% in the strength of bars cast from the same ladle of iron, but 2½ minutes apart. Since the figures are the averages of three bars in each case, there is no telling what the actual extremes might have been.

Chapters on the grades of pig iron as still found in the market, and the effect of aluminum and other metals on cast iron complete the work.

Perhaps the summing up of the evidence is the most difficult part in this review. When the writer was requested to take the matter of a review of this book in hand and had promised to do so, he felt delighted at the prospect of studying the results of Mr. Keep's many years of investigation, and the conclusions derived from a somewhat stormy career in the great foundry revolution we are just passing through. On opening the book, however, and finding it practically an exposition of a method which must have cost Mr. Keep much labor and treasure to devise, which he naturally would hate to throw away, yet which has probably been discarded by as many foundries as are using it today, the writer felt it his duty to the foundry world not to beg to be excused from the work even at the risk of offending where not intended.

In view of the fact that throughout the book the investigations of other foundry experts, who have brought out many points at variance with its contents, have been either overlooked or simply ignored, the writer cannot help feeling that although a fellow-member with Mr. Keep in the American Society of Mechanical Engineers, that body did well in suspending the work of its committee on testing, so far as cast iron was concerned, until the atmosphere has cleared a little more.

New York, Feb. 27.

Seventieth Anniversary of Baldwin Locomotive Works.

The Baldwin Locomotive Works celebrated the 70th anniversary of their founding with a banquet at Philadelphia, Feb. 27. Presidents and other officials of the prominent railroads of the country and heads of many manufacturing concerns participated in the celebration, which was held at the Union League Club. John H. Converse acted as toastmaster and those whom he introduced included George F. Baer, president of the Philadelphia & Reading Railway; John P. Green, first vice-president of the Pennsylvania Railroad; Stuyvesant Fish, president of the Illinois Central Railroad; Assistant Attorney General of the United States James M. Beck and J. Harris Sanders, of London.

The Baldwin Locomotive Works were founded by Matthias W. Baldwin. He had opened a machine shop in 1825. In the summer of 1831 he was invited to build a locomotive for the Philadelphia & Germantown Railroad Co., and had an opportunity to inspect the parts of the John Bull, a locomotive built by Stephenson for the Camden & Amboy Railroad Co. Prior to that time he had built a miniature locomotive for Mr. Peale, of Peale's Museum, and it was exhibited in motion on a circular track. It took him about a year to build this first locomotive, and the trial trip was made Nov. 23, 1832. The Baldwin works are now owned by Burnham, Williams & Co., the members of the firm being George Burnham, William P. Henszey, John H. Converse, William L. Austin, Samuel M. Vauclain, Alva B. Johnson and George Burnham, Jr.

The 1,000th locomotive was built in 1861, the 10,000th in 1889 and the 20,000th last week. The number of locomotives built last year was 1,375, or more than half the output for the country and one-fourth the output for the world. There are 11,000 men employed. There were in the world in 1892 the "Zeitschrift des Vereines Deutscher Ingenieure" estimated 109,000 locomotives. The number now is about 120,000. Of these, this country holds over 39,000, or nearly one-third. The world calls for about 5,000 new locomotives annually.

The rail mill at the South Works of the Illinois Steel Co., Chicago, made a record, on the day turn, Saturday, March 1, in turning out 1,469 tons of 80-pound rails. The tonnage for the week was 16,323 tons.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Conklin Tinplate Metal Co., Atlanta, Ga., has been incorporated with a capital stock of $60,000 to deal in metals, etc. Charles A. Conklin and John N. Goddard are the incorporators.

George H. Ford, Empire Bldg., Atlanta, Ga., is in the market for second-hand Corliss engine, or one with Corliss economy, 150-horsepower; also two 100-horsepower boilers.

The Brownwell Roller Ball Axle Co., St. Louis, Mo., has been incorporated with a capital stock of $100,000, by Frank H. Koch, P. H. Bopp, J. Black and others.

The C. H. Shaw Pneumatic Tool Co., Denver, Colo., has been incorporated with a capital of $50,000, to manufacture pneumatic hammers.

The Shultz Belting Co., St. Louis, has increased its capital stock from $300,000 to $360,000, and purchased additional ground, on which it will erect additions to its plant.

The Iroquois Machine Co., of Bedford, Westchester county, N. Y., was incorporated at Albany, Feb. 25, with a capital of $650,000. The directors are: W. W. Gibbs and Frederick P. Warfield of New York City; Edwin A. Smith and H. C. Babcock, of Providence, R. I., and Ogden Brewer of Montclair, N. J. Mr. Gibbs was formerly connected with the Mossberg & Granville Co., of Providence, R. I., and the new company is to manufacture wire drawing and other machinery under his patents.

The Rountree Construction Co., Mermod-Jaccard Bldg., St. Louis, is in the market for hoisting engine, rip saw, buzz saw and small saw mill.

The Aetna Locomotive & Machine Co., Seattle, Wash., has been incorporated by E. C. Hawkins and others, with a capital stock of $300,000. A plant to cost $150,000, for the construction of freight cars, will also be built.

The Penman Tank & Boiler Works, East Chicago, Ind., is arranging for the removal of its plant to Beaumont, Tex., which is due to the many contracts the company has received from the Texas oil fields.

The J. R. Morgan Engineering & Construction Co., of Columbus, O., is to be incorporated with a capital of $200,000. The officers are: Edward Ackland, president; John R. Morgan, vice president and general manager; Robert B. Bryson, secretary, and Gilbert D. Preston, treasurer. Other directors are: Richard E. Ackland, Thomas Johnson, Edward Johnson, Philip L. Schneider and Lemuel D. Lilley. Mr. Morgan was formerly of the Morgan Engineering Co., of Alliance, and more recently of the Case Mfg. Co., Columbus. Associated with him in management will be Wm. G. Hildebran, recently connected with the Wellman-Seaver Engineering Co., of Cleveland, and Chas. F. Neuwirth, lately with the Case Mfg. Co. The new company will build traveling cranes and other hoisting equipment. Construction work will begin at once. The first building will be a machine shop 240x100 feet.

The Jackson Drop Forging Co. has been incorporated in West Virginia, with principal office at Cleveland, O.; capital stock authorized, $5,000; subscribed and paid in, $1,000. H. A. Jackson and others are incorporators.

The Frontier Engine Works of Buffalo, N. Y., has received a charter of incorporation. Capital, $20,000. Directors: Abram Durr, W. H. Johnson and John Johnson, of Buffalo.

The Michelmann Boiler Co., of Quincy, Ill., will increase capital stock from $10,000 to $50,000, and will enlarge present plant to double capacity and later build on the three acres secured for a site at Walton Heights.

A Youngstown, O., dispatch says that W. Tayler and John O'Dea, of Niles, and Charles Thomas, of Struthers, are planning for the erection of a plant to manufacture sheets. They are looking for a site at Niles and Hubbard.

The Ball Bearing Co., 2322 Market street, Philadelphia, Pa., manufacturers of ball and roller bearings for all kinds of machine construction, announce the removal of their plant from Boston, Mass., to Philadelphia, where they have exceptional facilities for handling their increasing business. George H. Bowler, Cleveland, recently purchased the equipment of

the Boston plant consisting of over 60 tools, and had them shipped to Cleveland with a view to placing them in his warehouse. But from inquiries on hand from local customers he was enabled to sell every tool from the cars.

G. F. Wentzel, Seattle, Wash., is negotiating with Ohio manufacturers for the establishment there of a plant for structural work.

The Kutztown Foundry & Machine Co., Kutztown, Pa., expects to increase its capital stock from $50,000 to $100,000 to enlarge the plant.

On March 1 the Walton Mfg. Co., Galesburg, Ill., moved into a new plant. It will add sufficient machinery to do all kinds of engine and machine work, and will have a new 18-foot lathe, a large planer and drill press.

The Snell Cycle Fittings Co., of Toledo, has purchased a considerable portion of the machinery, tools and stock of the defunct Fremont Drop Forge Works, of Fremont, O., and will move it to Toledo. The firm will extend its forging business along new lines.

The Beardsley & Hubbs Mfg. Co., of Shelby, O., has increased the capital stock from $100,000 to $150,000, and will add equipment for the production of automobiles. H. H. Cockley has been elected a director in place of his father, D. L. Cockley, who died recently.

The Rockaway Iron & Steel Co., Rockaway, N. J., is in the market for a heavy shear, engine driven, with a capacity of about 5 inches square. Plate shear pattern desired, either new or second hand.

The Thomas-Fordyce Co., Little Rock, Ark., has been formed to conduct a general foundry and machinery business. It is capitalized for $250,000, $100,000 of which is paid in. The officers are: Dr. A. D. Thomas, president; John R. Fordyce and W. R. Mattox, vice-presidents; O. H. Thomas, secretary, and Ben D. Shaad, treasurer. The new company takes over the business of the Thomas Mfg. Co. and the Little Rock Gin & Machine Co.

The Stanley Works, New Britain, Conn., one of the largest butt and hinge manufacturing plants in the world, will be greatly increased in size shortly. At a meeting of the stockholders held last week it was decided to increase the capital stock from $500,000 to $1,000,000. The amount realized from the sale of stock will be expended in building additions to the plant.

The Chataugay Ore & Iron Co., of Lyon Mountain, N. Y., has increased its capital stock from $750,000 to $2,750,000. The stock has been divided into $750,000 first preferred, the same amount of second preferred and $1,250,000 of common stock. Smith W. Weed is president and Talbot Oliphant is secretary.

The Southern Rolling Mill Co., of Montgomery, Ala., has been incorporated with $60,000 capital to operate a merchant mill. B. S. Catchings, J. S. Dyer and W. L. Sims are the incorporators.

The Southern Metal Co., of Orangeburg, S. C., has been incorporated with $10,000 for the purpose of manufacturing iron and steel. William S. Barton is president.

The Sprague Foundry & Machine Co., of Council Bluffs, Ia., has been incorporated with $25,000 to conduct a machine shop and foundry. Robert M. Sprague, and others, are the incorporators.

The Chase Rolling Mill Co., of Waterbury, Conn., has increased its capital stock from $500,000 to $800,000.

The Right Manufacturing Co., of New York city, has been incorporated with $100,000 capital to manufacture machinery.

The Sharon Brass Co., of Sharon, Pa., has been incorporated with $50,000 capital to manufacture brass castings of all kinds and sanitary goods. M. O. Sherock has been elected president; J. L. Merritt, secretary. The above officers, together with R. A. Wilson and T. L. Woodward, are the incorporators.

The Lorimer & Gallagher Construction Co., of Chicago, Ill., and the Walsh Construction Co., of Davenport, Ia., have been consolidated and have been reincorporated with $250,000 capital. The concern will continue to build heavy machinery and will greatly increase the output.

F. Meyer & Bro. Co., Peoria, Ill., will erect a one-story brick addition to its furnace factory, to cost $1,500.

The American Tool & Saw Filer Co., of Sioux City, Ia., has been incorporated with $100,000 capital. J. E. Sanson, R. L. Barnes, I. W. Goodner and R. J. M. Tallmar are the incorporators.

Fires and Accidents:—

The Glauber Brass Mfg. Co.'s plant, Cleveland, was damaged by fire to the extent of $35,000 on March 2.

A portion of the roof at the South Chicago Furnace Co.'s furnace, South Chicago, Ill., collapsed last week, killing two men and seriously injuring others.

The Iola plant of the Pittsburg Foundry Co. at Iola, Kan., was destroyed by fire Feb. 25. Loss about $7,500.

New Construction:—

The plant of the St. Louis Steam Forge & Iron Works, St. Louis, manufacturer of car axles and railroad forgings, has been purchased by the St. Louis Mountain & Southern Railway, and the former company will build on a new site.

The Southern Railway will transfer its machine shops from Memphis, Tenn., to Tuscumbia, Ala., and is erecting buildings in the latter city at a cost of $30,000.

The W. A. Jones Foundry & Machine Co., Chicago, has had plans prepared for a three-story machine shop, 160x60 ft. which will be added to its plant on North avenue and Noble street.

The D. M. Sechler Carriage Co., Moline, Ill., will build a five-story addition, 100x100 feet. A steam plant will be installed with a boiler of 200-horsepower.

N. A. Christensen Engineering Co., Milwaukee, Wis., has had plans prepared for a five-story steel construction building to include machine shop and to cost $150,000.

The Fountain City Drill Co., LaCrosse, Wis., will build an addition to its foundry, 100x50 feet.

The Dimmick Pipe Co., Birmingham, Ala., is spending $25,000 in improving and enlarging its foundry.

The Battle Creek Machine & Foundry Co., Battle Creek, Mich., is having plans prepared for a two-story machine shop, 40x80 feet, and a one-story foundry building, 40x80 feet.

The Industrial Works, Bay City, Mich., will largely increase the floor space in its crane shop and paint house. This has been necessitated by the increasing pressure of business, which for some months has compelled the company to operate its plant night and day.

Pierpont & Heaton, Salt Lake City, Utah, will shortly ask bids for the erection of a foundry, 35 x 100 feet.

T. C. Roberts, for eight years in charge of the Columbia foundry, St. Joseph, Mo., associated with G. D. Berry and others will build a new foundry and machine shop there. The same interests will erect a foundry and architectural iron plant at Kansas City, Mo. The St. Joseph enterprise will require $100,000; that at Kansas City $250,000.

M. R. Zahniser, Washington, Pa., will erect a foundry. The main building will be 60x82. Another building 25x32 feet will be for patterns, and a third, the furnace department, 20x60 feet. It will be completed by the middle of April.

The Bostwick Steel Lath Co., of Niles, O., capitalization $40,000, composed of Warren and Niles capitalists, may move its works to Warren, O., in June, because the buildings now occupied have been purchased by the Pennsylvania Co.

Jackson, Tenn., has just secured the Brasius machine factory, of Terre Haute, Ind. The company manufactures sewing machines.

H. H. Green, of the Variety Iron Works, Seattle, Wash., has purchased a site, 120x165, for the location of a foundry.

The National Iron & Wire Co., of Cleveland, will expend $3,000 in a brick addition to its plant on Hamilton street.

Ground has been broken for a brick addition, one story, 30x60 feet, to be the Chase Machine Co.'s plant, Cleveland.

The contract for the erection of the Cockfield-Getty foundry, Cedar Rapids, Ia., has been let. The main building will be 42x88 feet, one story, of brick. An addition 21x40 feet will accommodate the boiler and cupola rooms.

The Moffat Foundry Co., Weston, Can., is building a large warehouse for storing manufactured goods. New offices are also being built.

The Geo. H. Smith Steel Casting Co., of Milwaukee, whose foundry was completely destroyed by fire on Feb. 19, is taking immediate steps to rebuild. The company had recently completed an addition to its foundry, the entire plant covering a space of 300x150 feet. With the third 10-ton crane recently

added and other new and up-to-date machinery the company had a well equipped plant. As the boiler room and power plant were not totally destroyed it will be possible for the plant to be again in operation within a few weeks.

The foundry of the Best-Scott Foundry & Machine Co., Ltd., at Warren, Pa., which is now under erection, will be running early in March. The concern will make castings of all kinds of iron, semi-steel and brass. The officers are John Best, chairman; John A. Viele, secretary and treasurer, and R. J. Scott, manager.

The Alabama Iron Works, Mobile, Ala., will make improvements to plant at a cost of $12,000, the most notable of which will be the erection of a substantial brick addition.

Crandal & Stone., Binghamton, N. Y., will expend about $20,000 in building a one-story brick machine shop 150 by 125 feet and fireproof.

An addition will be built to the boiler house of Mayer & Co.'s file works, Philadelphia.

The Monmouth Plow Co., Monmouth, Ill., is having plans prepared for a building, three stories high, 80x360 feet, to cost $20,000.

The Tubular Lock Co., of Myersdale, Pa., has purchased an abandoned plant and will convert it into a lock factory. Considerable machinery will be installed. An addition 40x50 feet will be erected to the plant immediately.

The tinning department of the Crescent plant of the American Tin Plate Co., Cleveland, O., is being enlarged by the erection of a new building 66x154 feet.

The Metcalf Mfg. Co., Quincy, Ill., will erect a foundry and operate the same in connection with its plant. The company is in the market for the equipment for the entire plant.

The National Enameling & Stamping Co., St. Louis, Mo., is erecting a new foundry.

The Hilles & Jones Co., Wilmington, Del., will erect a new pattern shop.

Went Bros., Findlay, O., will erect and equip a foundry in connection with their plant. The foundry building will be 300x60 feet.

The Pittsburg District:—

The headquarters of the Amalgamated Association of Iron, Steel & Tin Workers of America will be removed from the Bissell building to the new House building at the corner of Water and Smithfield streets, on April 1.

The Pittsburg Malleable Iron Co. will install an additional 15-ton air furnace.

Drake & Stratton, Ltd., of Pittsburg, have received contracts for the stripping on the Mesabi iron ore range of about 1,400,000 cubic yards of material during the next two months. Some of the mines are properties of the United States Steel Corporation, while one of the properties is owned by the Sharon Steel Co.

General Industrial Notes:—

The Strathy Wire Fence Co., Ltd., Owen Sound, Ont., was organized last summer, though the fence has been in use in Eastern Canada for some years. The system of manufacture is at present a hand assembled one, but special machinery is being built by Pittsburg engineers to weave the fence complete and it is expected that a capacity of from 700 to 1,000 rods of fencing will be made in ten hours. The first machine will be placed in operation about May 1.

The Canadian General Electric Co., Ltd., Toronto, Ont., has under construction the works of the Canada Foundry Co., which will be owned and operated by the former firm. The new foundry plant will cover an area of 32 acres and will be a notable addition to the already extensive works. The company manufactures a complete line of electrical apparatus, from generators to carbons and porcelain goods, and the foundry will handle architectural iron, supplies for waterworks and railroads, ornamental iron as well as a general line of machine shop and foundry work.

The firm of Horsburgh & Scott, Cleveland, manufacturers of gear cutting machinery, have been succeeded by the Horsburgh Mfg. Co., Mr. Horsburgh having bought out the interest of his partner.

The Cleveland office of the Marshall & Huschart Machinery Co. has closed a contract for a number of machine tools for the Wheeling & Lake Erie Railway shops at Norwalk. They are furnishing several Gould & Eberhardt gear cutters for the equipment of the new plant of the Alliance Machine Co., Alliance, O.

The Brown Hoisting Machinery Co. of Cleveland has secured a contract from the Haarlemsche Machine Fabrick of Haarlem, Holland, calling for the supply of a bridge tramway gravity system. This machine will serve as mechanical equipment for an extensive ore handling plant, which is to be erected by the Dutch firm.

The Fox Pressed Steel Car Co., Joliet, Ill., whose plant has been idle for several months on account of a strike, resumed operations several days ago with a new force.

The plant of the Maywood Foundry & Machine Co., Maywood, Ill., manufacturer of molding machines, pneumatic rammers and gas engines, has been purchased by the Featherstone Foundry & Machine Co., Chicago. F. E. Lonas, president of the former company, will retain the patents and patterns of the machinery made by it and will continue in the business as heretofore.

The Arnold Electric Power Station Co., Marquette Bldg., Chicago, will install an electric plant in the depot of the Chicago & Alton Railway at Springfield, Ill., to furnish heat and light for the passenger and freight station, power for the arc lamps at street crossings and for the station sign. The equipment will include two 75-horsepower internally fired boilers, and one 60-k. w. General Electric alternator driven by an Ideal engine.

The Milwaukee Electric Co., Milwaukee, Wis., has received an order from the American McKenna Steel Works Process Co., Joliet, Ill., for three 150-kilowatt generators, of about 800-horsepower in the motors, for the latter's plant being built at Tremley Point, N. J.

The new heating furnaces at the Falcon Works of the American Tin Plate Co., Niles, O., are working successfully. The furnaces were designed by William Banfield, district manager, and William Dixon, and show a saving in fuel of about 50 per cent. They heat the iron more uniformly without causing scale. All the furnaces at the Falcon works will be changed over. More black plate is used at the Falcon works than the hot mill capacity will provide, and black plate is shipped from other plants of the American Tin Plate Co. The Falcon works contain six mills, and this number is not now to be increased.

A bill was filed in the United States Circuit Court at Pittsburg last week by Robert D. Gibson, of Youngstown, O., against the Standard Automatic Gas Engine Co., of Oil City, Pa. Plaintiff asserts that he was a stockholder in the company and was appointed its sole sales agent and was given a contract to that effect. The contract, however, was declared forfeited by the company, and he therefore asks that he be allowed $34,000, which he alleges is due him. He further charges that the plant has been advertised for sale, and asks that the sale be prohibited and the plant be placed in operation again, inasmuch as contracts are now on the company's books which will net $40,000 in a year.

Owing to the refusal of the Morgan Engineering Co., of Alliance, O., to reinstate a discharged employe, 150 machinists walked out last week.

Worth Bros. Steel & Iron Co., Coatesville, Pa., last week awarded contracts for the erection of four additional open-hearth furnaces with a capacity of 50 tons each. This will increase the open-hearth capacity of this plant fully 400 tons per day. A new open-hearth building will be erected for these furnaces and it will be so located that it can be readily increased in size at any time. The building will be equipped with all the latest labor saving devices, including several traveling cranes operating the entire length of the building.

At the annual meeting of the stockholders of the Empire Steel & Iron Co., held at New York last week, President Peckitt reported that during the year the outstanding stock of the Crane Iron Works had been purchased. The following board of directors was elected: Leonard Peckitt, Archer Brown, Frank M. Davis, Frank M. Jeffrey, Elverton R. Chapman, Junius S. Morgan, Mark T. Cox, Charles H. Zehnder and David B. Gamble. The statement of the year's operations follows: Gross earnings, $229,095; placed in sinking fund, $71,838; interest on Crane first mortgage bonds, $11,874; total charges, $83,712; net profits, $145,384; dividend 3 per cent on Empire preferred stock, $71,043; surplus, $74,341.

Angle Receiver Form.

COCHRANE RECEIVER SEPARATORS for HIGH PRESSURE ENGINES.

Because of the greater expansive force that can be obtained from high pressure steam much higher pressures are now carried in steam plants than formerly. By designing engines with large steam ports and valve openings, effort is made to reduce the drop in pressure, as the steam passes from the supply pipe to the engine cylinder.

It is equally important that the full boiler pressure be realized at the throttle valve, and there is no better way of compensating for the loss in pressure due to passing the steam through long lines of pipe than by placing a

COCHRANE RECEIVER SEPARATOR

right next to the throttle valve, or in the horizontal run of pipe as close to the engine as convenient, thereby providing a large steam reservoir, under full boiler pressure, from which the engine can take its supply.

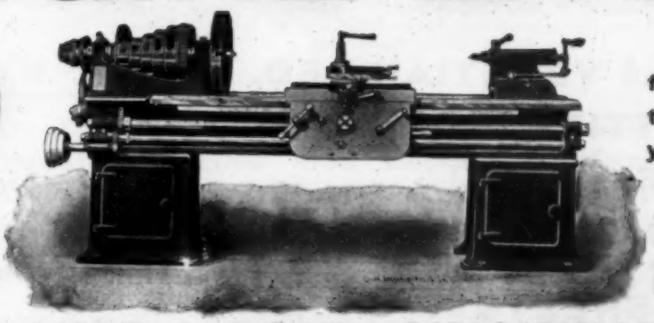
A long steam pipe, even though of large size, will not give the same results as a Receiver, because the flow of steam has to be stored in the pipe every time the engine takes steam through such a pipe. This means a loss.

The cost will not be very much, and the increase in engine economy amounts to no trivial quantity. Besides, these **COCHRANE RECEIVER SEPARATORS** will prevent accidents due to water in the steam.

HARRISON SAFETY BOILER WORKS,
Clearfield & 17th Sts., - - - PHILADELPHIA, PA.

ENGINE LATHES

QUALITY COUNTS. OUR LATHES Q XL ALL OTHERS



Unsolicited letters from first-class shops prove this. Copies of these are yours for the asking.

We build
LATHES EXCLUSIVELY.

SCHUMACHER & BOYE, CINCINNATI, O., U. S. A.

A MATTER OF CHOICE

LOTS OF FUEL, LITTLE STEAM, MUCH WASTE & DIRTY BOILERS — OR — LITTLE FUEL, LOTS OF STEAM, NO WASTE AND CLEAN BOILERS

ITS' UP TO YOU. THE LATTER IS ATTAINED BY THE USE OF STILWELL'S FEED WATER HEATER.

WRITE FOR INFORMATION

THE STILWELL-BIERCE & SMITH-VAILE CO.
M.O.B. 227. DAYTON, OHIO.

TIN PLATES

Coke Charcoal Roofing

Galvanized and Black Sheets

The J M & L A OSBORN CO. CLEVELAND COLUMBUS

American Steel & Wire Co.

NEW YORK, Empire Bldg. CHICAGO, The Rookery. WORCESTER, MASS. DENVER, 809 17th St. SAN FRANCISCO, 8 and 10 Pine St.

WIRE of every description, round, flat, square, triangular, and odd-shaped. Barbed Wire. Music Wire. Bale Ties. Wire Rods. Wire Hoops and Bands. Mattress, Broom, Weaving and Market Wires in all finishes. Special Wires adapted to all purposes.

NAILS, STAPLES, SPIKES and TACKS of all kinds. Standard Wire Nails in all sizes and shapes. Miscellaneous Fine Nails. Tacks in count and weight packages. Dowel Pins.

ELECTRICAL WIRES and CABLES of all kinds—Iron, Aluminum and Copper. Telegraph and Telephone Wires.

RAIL BONDS for Electric Roads.

SPRINGS, Clock, Motor, Car, Furniture, Agricultural and all kinds of Fine and Heavy Springs.

COPPERAS and VENETIAN RED.

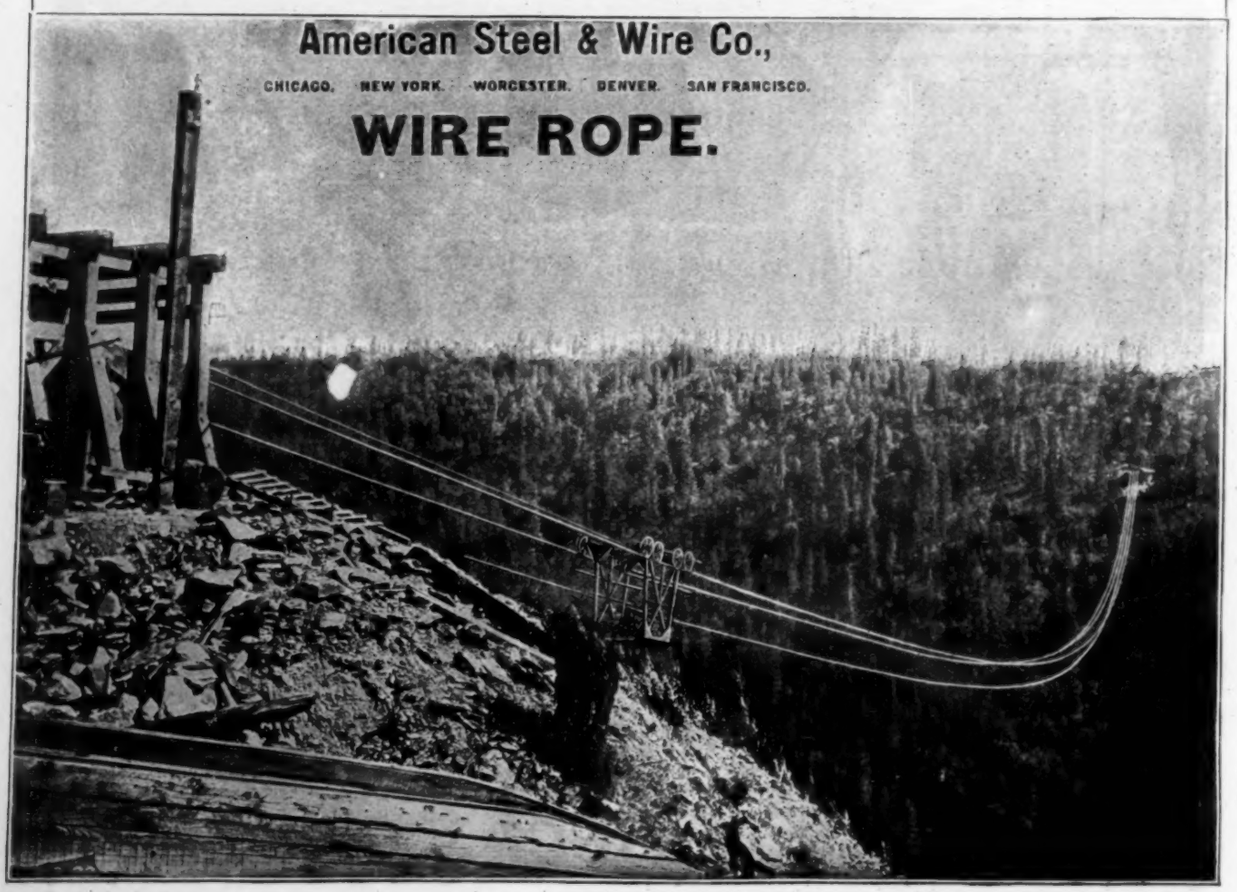
POULTRY NETTING, galvanized before weaving. All meshes and sizes.

HORSE SHOES, "Juniata" brand, iron or steel, in all sizes and patterns. Toe Calks.

COLD DRAWN STEEL, Shafting, Free Cutting Screw Steel. Roller Bearing Rods, Rounds, Squares, Hexagons, Flats and Special Shapes.

PLATES AND SHEETS of Bessemer and Open Hearth Steel.

SEE OUR EXHIBIT AT THE CHARLESTON EXPOSITION.



A RECORD WHICH STANDS ALONE!

ONE HUNDRED AND FIFTY TONS OF WIRE in a 22-hour run with only thirty-six Blocks.

THE SUPERFICIAL OBSERVER thinks our prices for Wire Benches are very high. He sees a bench, blocks and shaft, and realizes the fact they turn around just the same as the bench of twenty-five years ago did. He realizes that they are a little heavy, but don't see very much difference.

THE MANUFACTURER WHO GOES INTO THE MATTER FULLY realizes the fact that our benches are carefully designed, our gearing all open-hearth steel, that all parts are heavy, with the result that our regular one-hundred-ton outfits have only thirty-six blocks, where the other manufacturers of wire machinery reckon sixty.

THE RESULT IS SIMPLY THIS: By installing an equipment of our machinery, the money you will save in wire-drawers' wages will pay for our plant complete in less than two years' time.

UP-TO-DATE MANUFACTURERS realize this and are equipping their mills with our machinery, paying the extra price. You had better look into this matter—it may save you dollars. Shall be pleased to hear from you.

THE TURNER, VAUGHN & TAYLOR CO., Cuyahoga Falls, O.

THE CUYAHOGA STEEL & WIRE COMPANY,

Office and Works: CUYAHOGA FALLS, O.

MANUFACTURERS OF

WIRE RODS.

Annealed and Galvanized Fence Wire.
Bright, Tinned and Coppered Market Wire.
Tinned Mattress and Broom Wire.
Annealed Stone Wire.

Wire Straightened and Cut to Lengths.

WIRE NAILS.

THE

LORAIN STEEL COMPANY,

Lorain, Ohio.

Rails, Blooms, Billets and Slabs.

STEEL CASTINGS

That will Forge, Weld and Temper. Will not Crystallize.

Graphite through the metal breaks up vibration.

GRAPHITE METAL CO.,
17 Cortlandt St.,
NEW YORK, U. S. A.

E MARK. REGISTERED.

For CASE-HARDENING

CARBURIZER is the most efficient material.

It penetrates deeper, gives a harder surface, with a tough core, in less time than any other case-hardening material.

CARBURIZER requires no preparation, contains no obnoxious substances, does not corrode the article, and **Iron** or **Steel** do not become brittle if properly treated.

The CARBON projected into the metal by our process is not lost, if the hardened piece requires re-heating.

Carburizer is fully **thirty per cent cheaper** than Granulated Bone, because of its lighter bulk-weight and quicker work.

FOR FULL PARTICULARS ADDRESS

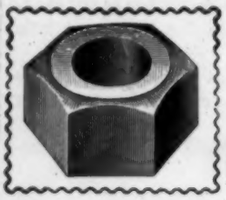
American Carburizing Co., 160 Pearl Street, NEW YORK.

FACTORY: Warren and Bay Streets, JERSEY CITY, N. J.

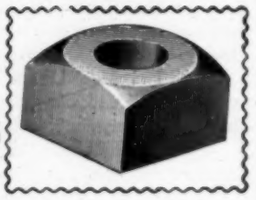
THE MILTON MANUFACTURING CO.,

Milton, Pa.

MANUFACTURERS OF



COLD PUNCHED NUTS



Hot Pressed Nuts, Plate Washers, etc.

Quality and Finish the Best. **Send Specifications for Prices.**

American Iron & Steel Mfg. Co.

General Offices at Lebanon, Pa., U. S. A.

MANUFACTURERS OF

MERCHANT BAR IRON

(Annual Capacity AND STEEL about 150,000 Tons)

Also Every Variety of

Machine Bolts, Nuts, Washers, Turnbuckles, Lag Screws

Railway and Dock Spikes, Harbey Grip and other Railway Track Bolts

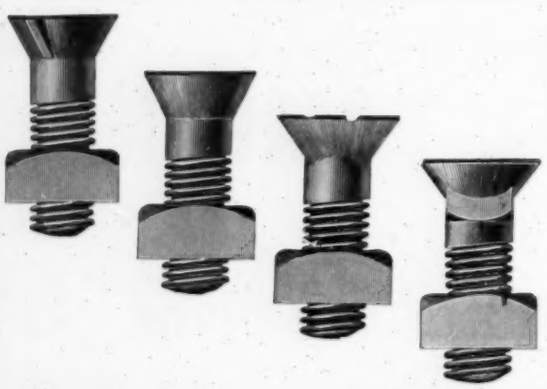
Boiler, Ship and Structural Rivets

CAR FORGINGS and RODS AND IRONS FOR BRIDGES, BUILDINGS, ETC., ETC.

This Company owns and operates the works formerly owned by

J. H. STERNBERGH & SON, Reading, Pa. NATIONAL BOLT, NUT AND RIVET WORKS, Reading, Pa. LEBANON IRON CO., Lebanon, Pa

EAST LEBANON IRON CO., Lebanon, Pa. PENNSYLVANIA BOLT AND NUT CO., Lebanon, Pa.



Plow & Cultivator Bolts

OF ALL KINDS.

QUALITY THE VERY BEST.

PRICES RIGHT.

THE UPSON NUT CO.,

CLEVELAND, OHIO.

REPUBLIC IRON & STEEL CO., CHICAGO, ILL.

BAR IRON BAR STEEL

MACHINE BOLTS, CARRIAGE BOLTS, GIMLET POINT COACH SCREWS, TURNBUCKLES.

NUTS. **R. R. SPIKES.** **PIG IRON.**

NEW YORK, CLEVELAND, BIRMINGHAM, BUFFALO, CINCINNATI, ST. PAUL, SAN FRANCISCO, ST. LOUIS, BUTTE, MONT.

American Sheet Steel Company

Battery Park Building New York

Manufacturers of all varieties of

IRON AND STEEL SHEETS

Black and Galvanized
Plain and Painted
Flat, Corrugated and "V" Crimped

Apollo Best Bloom Galvanized Sheets
W. Dewees Wood Company's Planished Iron
W. Dewees Wood Company's Refined Iron
Wellsville Polished Steel Sheets

DISTRICT SALES AGENTS

W. J. Wetstein & John W. Good, Security Building, St. Louis
S. J. Waterman, Union Trust Bldg., Cincinnati
Hoge & Swift, Portland, Oregon
F. A. Goodrich & Company, Chamber of Commerce, Detroit
Wm. B. Isaacs, 226 Market Street, San Francisco
B. & S. H. Thompson & Company, Montreal, Canada
T. W. Simpers, Land Title Building, Philadelphia
F. C. Milliken, Vandergrift Building, Pittsburg
S. L. Mitchel, Hennen Building, New Orleans
W. T. Shannon, 34 West Ninth Street, Chattanooga
Lee Chamberlain, Los Angeles
L. A. Hastings, 1622 Arapahoe Street, Denver

DISTRICT SALES OFFICE: MARQUETTE BUILDING, CHICAGO

H. H. DICKEY, Pres. *A. F. BAUMGARTEN, V. Pres.* *H. E. WEBER, Sec'y & Treas.*

SHEETS OPEN HEARTH-BLUE ANNEALED,

GAUGES 10 TO 22, **WIDTHS UP TO 48".**

BLACK PLATES,
HARROW DISCS, BILLETS.

FORGINGS, OPEN-HEARTH
STEEL CASTINGS, BARS.

MARYLAND SHEET & STEEL CO., Cumberland, Md.

American Steel Hoop Company

GENERAL OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

DISTRICT SALES OFFICES:

PHILADELPHIA, Harrison Building
BOSTON, Telephone Building
CINCINNATI, Union Trust Co. Building
NEW YORK CITY, Empire Building
CHICAGO, The Rookery
ST. LOUIS, Chemical Building
CLEVELAND, Perry-Payne Building
ST. PAUL, Pioneer Press Building
SAN FRANCISCO, 226 Market Street
ATLANTA, GA., Equitable Building

FOREIGN SALES OFFICES:

LONDON, 78 and 72 King William Street
MONTREAL, Temple Building
CITY OF MEXICO, Mexico, 924 Apartado

MF

This is the trade mark stamped on every sheet of **MF Roofing Tin**—the best roofing tin made. It is evidence that it has the heaviest and richest coating of pure tin and new lead, dipped by the palm oil process, and manufactured entirely by *hand* labor. **MF** is impervious to rust—will last a lifetime. Ask your roofer for **MF** Roofing Tin—or

write to **W. C. CRONEMEYER**, Agent, Carnegie Building, Pittsburg.
for illustrated book on roofing.

AMERICAN TIN PLATE COMPANY, New York.

ESTABLISHED 1879.

The Ohio Sand Company.

Shippers of all Grades of
MOULDING SAND.

Our Sand is SECOND TO NONE. Banks at Conneaut and Kingsville. Samples and Prices on Application. **Conneaut, Ohio.**

ARE YOU A FOUNDRY FOREMAN, ASSISTANT FOUNDRY FOREMAN, OR FOUNDRY BUYER?

We want your address. If you will drop us a postal card, we will send you **our Annual Date Book**, also a **Pamphlet** of much interest, dealing entirely with the mixing and refining of

PLUMBAGO OR SILVER LEAD

for all purposes for which it is used in the Foundry and Core Room. This will place you on our regular mailing list. We are continually getting out **Booklets, Circulars and Catalogues**, which will be found of interest and value, and they will be mailed to you as soon as published.

All we want is your address.
Send it on a postal card today.

THE J. D. SMITH FOUNDRY SUPPLY CO.

Department 18 CLEVELAND, OHIO.

Kier Fire Brick Co.

Brands: SALINA, S. C., ETNA.
Works at SALINA, PA.

Manufacturers of FIRE BRICK.
Phone 1181. Established 1845.
Office Rooms 27-28 Stevenson Bldg., 341 Sixth Avenue. Pittsburg, Pa.

Cleveland Union Station.

Pennsylvania Lines

Foot of Bank Street.

TICKET OFFICES at Union Station, Euclid Av. and Woodland Av. Stations.
New City Ticket Office, No. 1 Euclid Av., Cor. Public Sq.
THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
*Daily. †Daily except Sunday.

*Daily. † Daily except Sunday.

From Cleveland to	Leave.	Arrive.
Pittsburg & Bellaire	†7:00 a m	†11:20 a m
Salem & Pittsburg	*8:00 a m	*8:30 p m
Salem & Pittsburg	*4:00 p m	*11:30 a m
Philadelphia & New York	*4:00 p m	*11:30 a m
Baltimore & Washington	*4:00 p m	*11:30 a m
Pitts., Bellaire, & East	†1:40 p m	†6:30 p m
Baltimore & Washington	†1:40 p m	†6:30 p m
Ravenna & Alliance	*5:00 p m	*8:10 a m
Philadelphia & New York	*11:30 p m	*5:00 a m
Baltimore & Washington	*11:30 p m	*5:00 a m
Pittburg & Wellsville	*11:30 p m	*5:00 a m

Mt. Vernon & Pan-Handle Route

From Cleveland to	Leave.	Arrive.
Akron, Columbus, & Cin.	*8:10 a m	*5:50 p m
Indianapolis & St. Louis	*8:10 a m	*5:50 p m
Millersburg & Columbus	†1:20 p m	†1:05 p m
Col., Cin., Ind., & St. Louis	*7:30 p m	*7:30 a m

Do You Seek Trade With the Foundries?

THERE are 5,933 foundries in this country and Canada.

1,055 of these are new concerns which have come into existence during the past two years. More than 600 foundries quit business during the same period.

The chances are that your mail matter does not reach all of the new firms. It is also a safe proposition to gamble that you are sending out letters right along to people who have quit the foundry business.

The way for you to cover the foundry trade completely is to have a copy of

Penton's Foundry List
FOR 1902

in your office. This is the only reliable directory of foundries published. It is now ready for delivery. Only a limited edition will be printed, so you had better order a copy early.

The salesman on the road says that with a copy of this list in his pocket he can get over the ground in half the time and see everybody. Without it he is looking up people who have no foundries and missing others who have. It will be money in your pocket to see that your men have a copy.

The Iron and Steel Press Co., Pubs.
CLEVELAND, O.

MOLDERS' TEXT BOOK.

Being Part II of American Foundry Practice, giving the best methods and rules for obtaining good castings, with detailed description for making molds. A thoroughly practical book that should be in the hands of every molder. By Thomas D. West. 460 pages, cloth, $2.50.

The Iron and Steel Press Co.,
CLEVELAND, OHIO.

MOLDING SAND==STANDARD GRADES.

Quality of more Importance than that of any other material used in a Foundry.

We handle Molding Sand of the highest merit only.

MASTER VAN DYE.

Our Specials are:

Waterford, New Albany, Dye's Special, Red Machinery and the famous Newport Sand.

Unlimited in quantity and shipping capacity.

Newport 1902

To the trade

Dear Sirs

with many thanks for past favors & hope to merit as liberal patronage in the future as had in the past relying mostly on the high merits of the sand

yours truly

Master Van Dyke

REPRESENTING

The Newport Sand Bank Company

NEWPORT, KENTUCKY.

STEEL CONSTRUCTION
IN ALL BRANCHES

BUILDINGS DESIGNED AND ERECTED
In all parts of the world
Roof Frames and Trusses Blast Furnaces and Steel Works
Cupolas, Ladles and Converters
Boilers, Tanks and Heavy Plate Work

RITER-CONLEY MFG. CO.
PITTSBURG, PA.

ROLLING MILL ENGINEERS.

Continuous Mills for the economical production of Small Billets, Bars, Rods, Hoops and Cotton Tie.

WIRE DRAWING MACHINERY.

Morgan Construction Co.,
WORCESTER, MASS.

THE RETORT COKE OVEN CO.

Engineers and Contractors for
RETORT COKE OVENS
With or without recovery of by-products

JOHN F. WILCOX, General Manager and Chief Engineer
General Offices: New England Bldg., CLEVELAND, O.

ALEX. LAUGHLAN & CO.
ENGINEERS AND CONTRACTORS
702-706 LEWIS BLOCK ::: PITTSBURG, PA.

WALTER KENNEDY
CONTRACTING AND CONSULTING ENGINEER
611 Penn Ave., PITTSBURG, PA.
Long Distance 'Phone 3174.

THE CHASE MACHINE CO.
111 ELM STREET, CLEVELAND, O.
Hoisting, Car Hauling, Docking and Automatic Towing Engines. Builders of the well known WOOTTERS GAS AND GASOLINE ENGINES.

THE WELLMAN-SEAVER ENGINEERING CO.
ENGINEERS AND MANUFACTURERS
New England Bldg. CLEVELAND, O., U. S. A.
Cable Address "WELLSEA" CLEVELAND

Steel Works, Rolling Mills, Metallurgical Furnaces, Manufacturing Buildings, Machinery for the most economical handling of all kinds of material.

Sole manufacturers of FORTER WATER SEALED REVERSING VALVES and FRASER-TALBOT MECHANICAL GAS PRODUCERS.

LONDON OFFICE: 47 VICTORIA STREET, WESTMINSTER

JULIAN KENNEDY, ENGINEER
PITTSBURG, PA.

MACHINERY FOR THE ECONOMICAL
PRODUCTION OF IRON AND STEEL

CONSULTATION AND EXPERT WORK IN
GENERAL ENGINEERING PRACTICE
CABLE ADDRESS "ENGINEER PITTSBURG"

IRON CITY ENGINEERING COMPANY
Successors to Fessenden & Ridinger
ELECTRICAL ENGINEERS AND MANUFACTURERS' AGENTS
Electric Light and Power installations. Generators, Motors, Arc Lamps, Engines and Boilers, Electric Supplies. Bell 'Phone L. D. Court 1599. P. & A. 'Phone Maine 1376. 410 Penn Ave., Pittsburg, Pa.

S. V. HUBER & CO.
CONSULTING ENGINEERS

Blast Furnaces, Bessemer and Open Hearth Steel Works, Continuous Mills, Hoop Mills, Merchant Mills, Automatic Mill Tables, Labor Saving Devices relating to Rolling Mills, Steam and Hydraulic Machinery.

Ferguson Bldg., PITTSBURG, PA.

Blast Furnace Construction.
ENGINEERS AND CONTRACTORS.
Open-Hearth Furnaces, Heating Furnaces, Soaking Pits. All Kinds Brick Work.

Sole Representatives, U. S. A. Massicks & Crooke's Patent Three Pass Fire-Brick Stoves, with McClure & Amsler's and G. W. McClure's Patent Improvements.
McClure & Amsler's Patent Two Pass Fire-Brick Stoves, with Centre Combustion Chamber.

G. W. McCLURE, SON & CO.,
Smith Bldg., PITTSBURG, PA.

Duff's Patent Water Seal Gas Producer
OVER 2,200 IN SUCCESSFUL OPERATION.
INVESTIGATION SOLICITED.
THE DUFF PATENTS CO., 608-609 Empire Bldg., PITTSBURG, PA.
Long Distance Telephone, 1898 Pgh.

Steel Works and Rolling Mill Engineers

Garrett-Cromwell Engineering Co.
New England Building : : : : : : : : CLEVELAND, O.

WE MANUFACTURE AND ERECT
STEEL FRAME MILL BUILDINGS
In All Parts of the United States.
IRON AND STEEL TANKS for Liquids or Gases.
GERM PROOF WATER FILTERS, 10 gal. to 10,000 gal. capacity per hour.

Riveted Steel Pipe.

Steel Stacks.

WM. B. SCAIFE & SONS CO.,
Founded 1802. PITTSBURGH, PA.

EYNON-EVANS
STEAM JET BLOWERS
FOR
Gas Producers

Will Improve both QUANTITY and QUALITY of Gas. . . . . .
Write us for Information and Catalogue.
We are Specialists in this line
The EYNON-EVANS MFG. CO.
New York Office, 107 Liberty St.
1517-19 Clearfield St., PHILADELPHIA, U. S. A.

STEEL CONSTRUCTION.
BUILDINGS DESIGNED, BUILT AND ERECTED.
STRUCTURAL MATERIAL carried in stock for immediate delivery.
PITTSBURG STEEL CONSTRUCTION CO., Allegheny, Pa.
Works: 26 Beaver Ave.

E. L. McGARY,
Consulting Engineer,
Complete Rolling Mill Plants.
223 Fifth Ave., PITTSBURG, PA.
Late Chief Engineer American Steel Hoop Co.

ROLLING MILLS and Steel Works MACHINERY.
THEO. J. VOLLKOMMER, 503 Lewis Block, Pittsburg.

Stand Pipes.
Girard, Ohio. GIRARD BOILER & MFG. CO.

DAVID LAMOND & SON,
CONTRACTING ENGINEERS,
FERGUSON BLOCK, :: :: :: :: PITTSBURG, PA.
Blast Furnace Construction.
AGENTS FOR C. H. FOOTE PATENT 3 AND 4 PASS FIRE BRICK STOVE.

Pittsburg Construction Co.
MILL BUILDINGS
OF WOOD, STEEL, BRICK OR CONCRETE CONSTRUCTION.
207 Bissell Block, Pittsburg.

EDWARD E. ERIKSON, Conestoga Building, PITTSBURG, PA.
Regenerative Gas Furnaces and Water Seal Gas Producers.
Produces Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

A B C OF IRON, NOW $1.00.
The Iron Trade Review, Cleveland, O.

THE ENTERPRISE BOILER COMPANY, YOUNGSTOWN, OHIO.
DRAUGHT STACKS, BLAST FURNACES AND HEAVY PLATE WORK A SPECIALTY. WRITE FOR ESTIMATES.

THE UNITED COKE & GAS COMPANY,
277 BROADWAY, N. Y.
COMPLETE COKE AND GAS PLANTS INSTALLED.
SPECIALTIES: Coke Ovens with and without Saving of By-Products.

BY-PRODUCT OVENS NOW IN COURSE OF ERECTION:

Lackawanna Iron and Steel Co	Lebanon, Pa.	232 Ovens.
Lackawanna Iron and Steel Co	Buffalo, N. Y	564 "
South Jersey Gas, Electric and Traction Co.	Camden, N. J.	100 "
Maryland Steel Co.	Sparrow's Point, Md.	200 "
Michigan Alkali Co	Wyandotte, Mich.	15 "

Write for the Carborundum Book

Tells about the most remarkable of all abrasive materials. Carborundum is almost as hard and sharp as the diamond—It is made into grinding wheels, sharpening stones, abrasive paper and cloth, and polishing powders. It is guaranteed to do more work, faster work and cleaner work than any other abrasive on earth.

The Carborundum Co.
Niagara Falls, N. Y.

TWO WRIGHT STEAM SPECIALTIES

Whose use guarantees boiler safety:

Wright Improved Safety Water Columns,

A high water alarm, a low water alarm, and both combined. Simple, durable, unfailing. Water carried at the proper level means a saving in fuel. Also prevents boiler repairs by stopping the incessant contraction and expansion resulting from unsteady water.

Thousands of Wright Water Columns in use—and every one is saving its cost over and over.

Wright Emergency Steam Traps.

They act insta taneously. Provided with three valves, any one alone capable of discharging any unusual inflow of water. It's the satisfactory trap.

WRITE FOR CIRCULARS.

WRIGHT MANUFACTURINC CO.,
30 Shelby Street, Cor. Woodbridge,
DETROIT, MICH.

The Lunkenheimer "Clip" Hose Gate Valve

Is a single disc, double-seated valve. Made of iron, all bearing parts of gun metal. Sizes ¼ to 3 inches. Fulfills all Underwriters' Association requirements. Unequalled for all ordinary pressures . . . . . Specify them and order from your dealer . . . Write for catalog of brass and iron engineering appliances of superior quality . . . . . .

THE LUNKENHEIMER CO.

BRANCHES: 26 Cortlandt St., New York.
35 Great Dover St., S. E., London.

Main Office and Works:
CINCINNATI, O., U. S. A.

OF INTEREST TO Manufacturers

Write for copy of pamphlet just issued by the

ILLINOIS CENTRAL R. R. COMPANY

giving reliable information concerning nearly 200 desirable locations for industries, and entitled

INDUSTRIAL SITES IN TEN STATES

Address GEO. C. POWER,
Industrial Commissioner Illinois Central R. R.
ROOM 506 CENTRAL STATION, CHICAGO, ILL.

Did You Ever See a Copy of
THE FOUNDRY
the only foundry journal published? SEND FOR ONE FREE.
The FOUNDRY, *Cleveland, O.*

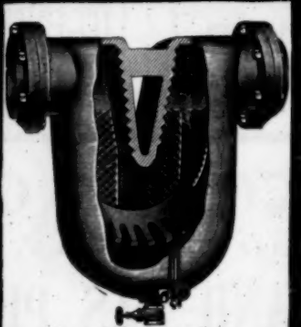


Fig. B. HORIZONTAL.

AUSTIN SEPARATOR COMPANY
159 Woodbridge St.
DETROIT, MICH.

Steam Separators

Austin Steam Separators

are built to separate all moisture from live steam and all oil and other impurities from exhaust steam. And they do it—to the satisfaction of thousands of steam users all over the United States and Canada. It's the Separator that always satisfies.

To prove our faith, let us send you one on 30 days' trial. If not satisfied, return it at our expense.

Oil Separators

L. L. CLINE Adv. Agt.